

VOL. XI

NO. 2

# UNITED STATES NAVAL MEDICAL BULLETIN

PUBLISHED FOR THE  
INFORMATION OF THE MEDICAL  
DEPARTMENT OF THE SERVICE

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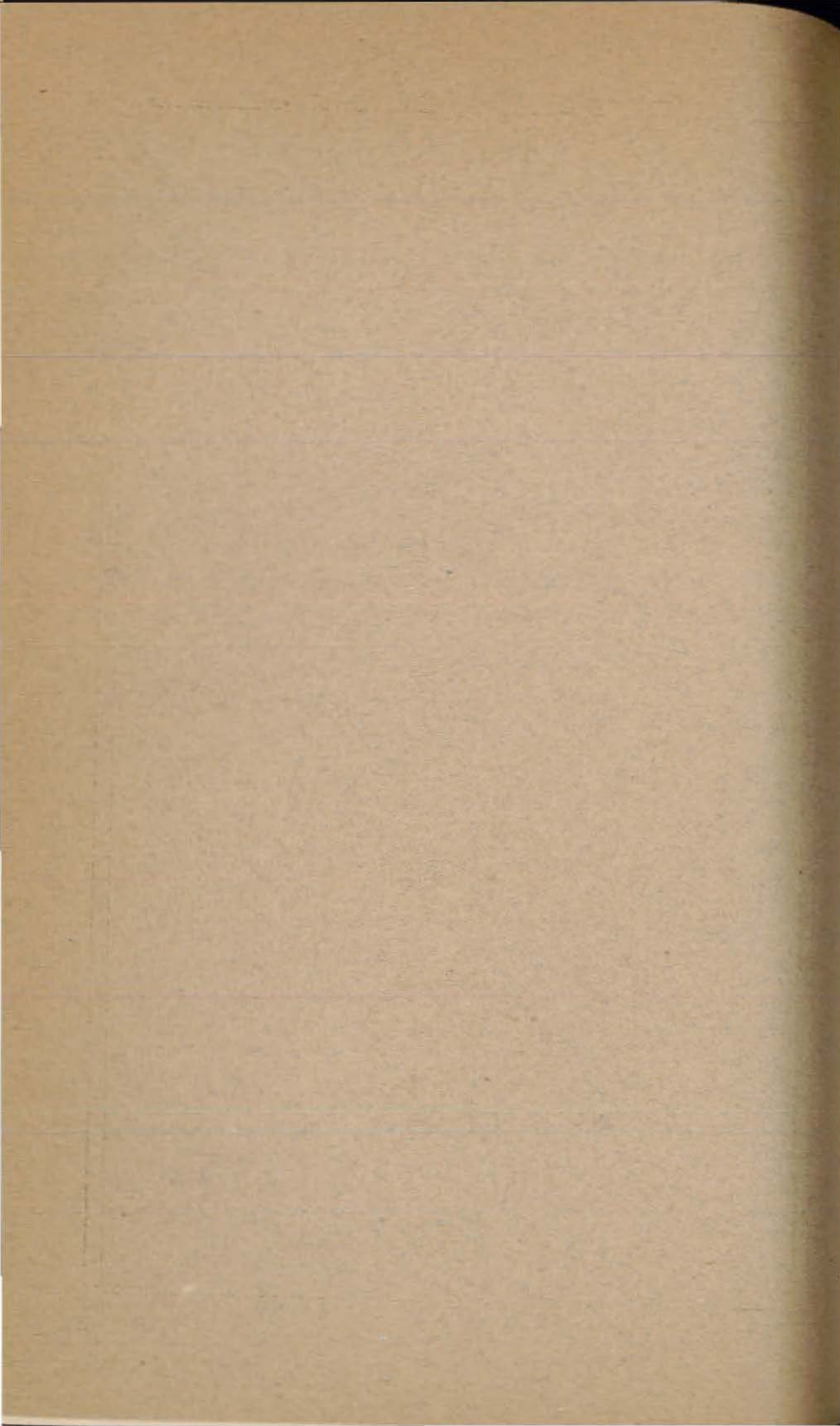
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THE BUREAU OF MEDICINE AND SURGERY  
NAVY DEPARTMENT  
DIVISION OF PUBLICATIONS  
PASSED ASSISTANT SURGEON ROBERT C. RANDELL, U. S. NAVY  
IN CHARGE

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APRIL, 1917  
(QUARTERLY)



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
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NAVY DEPARTMENT,  
*Washington, March 20, 1907.*

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,  
*Acting Secretary.*

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NOTE.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume I, No. 1, April, 1907.

Volume I, No. 2, July, 1907.

Volume I, No. 3, October, 1907.

Volume II, No. 1, January, 1908.

Volume II, No. 2, April, 1908.

Volume IV, No. 2, April, 1910.

Volume IV, No. 3, July, 1910.

Volume VI, No. 3, July, 1912.

Volume VII, No. 3, July, 1913.

Volume VIII, No. 3, July, 1914.

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SUBSCRIPTION PRICE OF THE BULLETIN.

Subscriptions should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C.

Yearly subscription, beginning January 1, \$1; for foreign subscription add 25 cents for postage.

Single numbers, domestic, 25 cents; foreign, 31 cents, which includes foreign postage.

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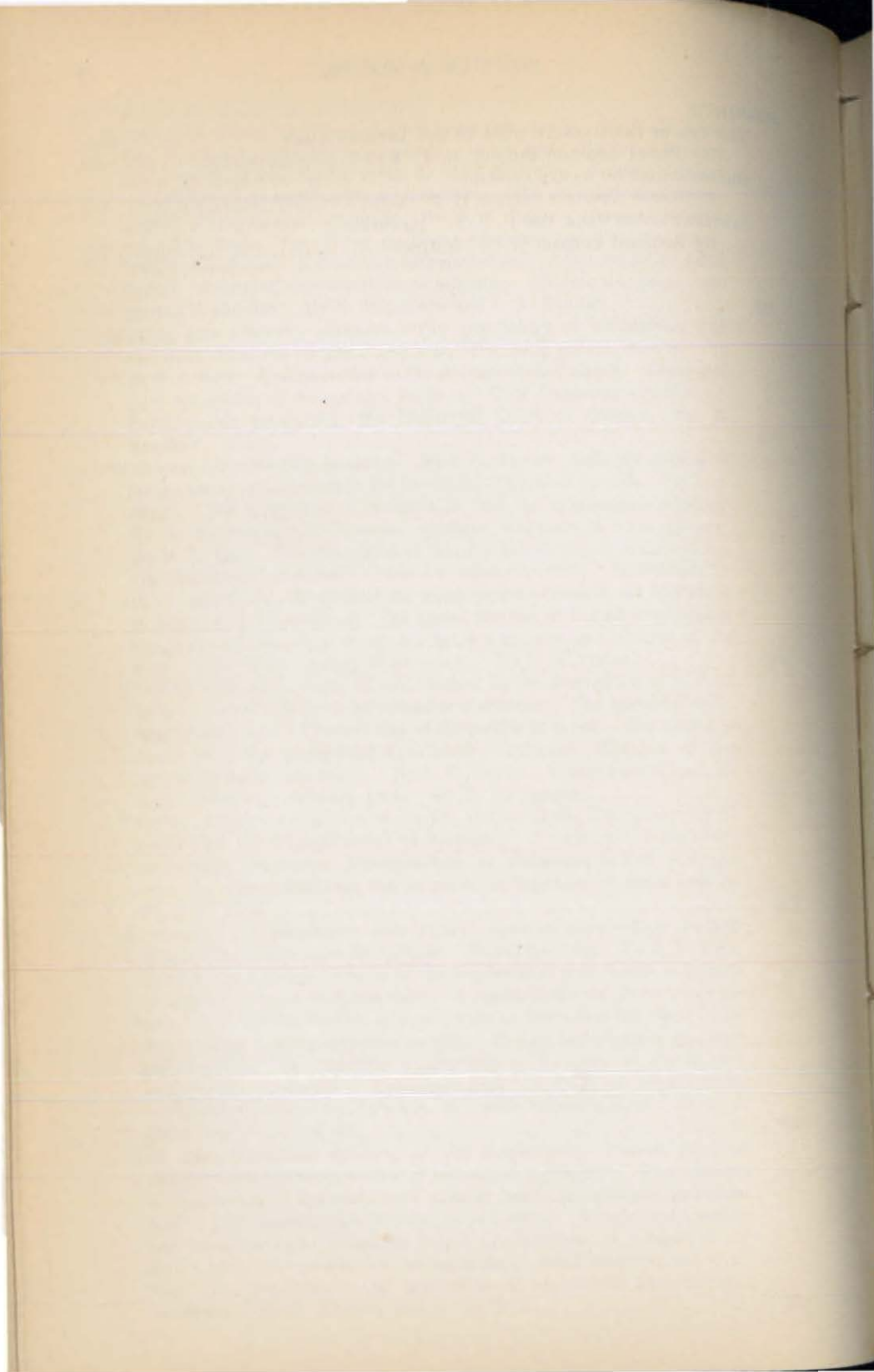
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## PREFACE.

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The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the personnel of the Medical Department of the Navy in the performance of their duties, with the ultimate object that they may continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the NAVAL MEDICAL BULLETIN shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, chemistry and pharmacy, advanced therapeutics, surgery, dentistry, medical department organization for battle, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part as extracts) throughout the service, not only will they be employed to some purpose as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Reviews of advances in medical sciences of special professional interest to the service, as published in foreign and home journals, will be given particular attention. While certain medical officers will regularly contribute to this work, it is urged that all others cooperate by submitting such abstracts from the literature as they may at any time deem appropriate.

Information received from all sources will be used, and the bureau extends an invitation to all officers to prepare and forward, with a view to publication, contributions on subjects relating to the profession in any of its allied branches. But it is to be understood that the bureau does not necessarily undertake to indorse all views and opinions expressed in these pages.

W. C. BRAISTED,  
*Surgeon General, United States Navy.*

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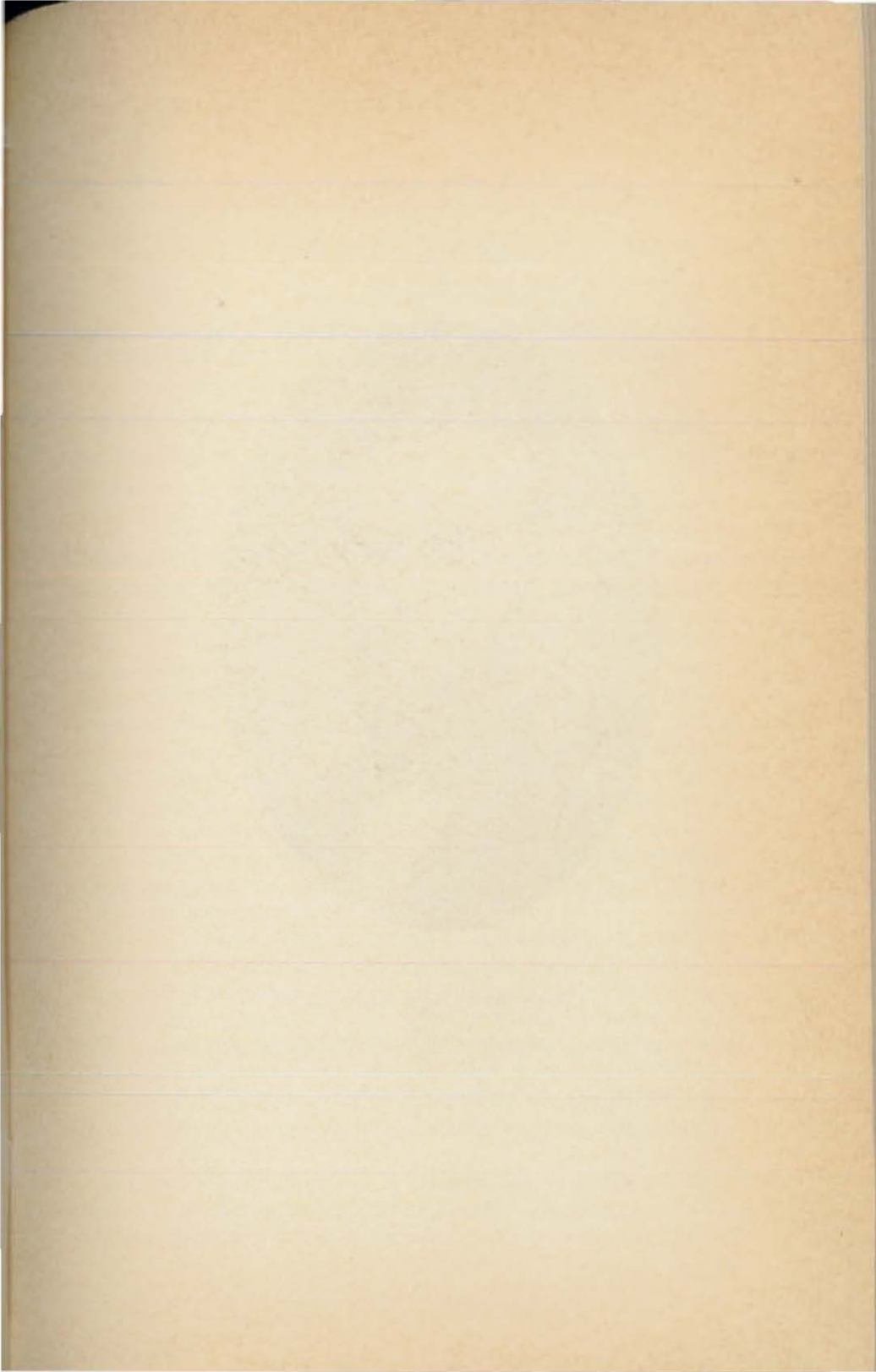
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JAMES MARKHAM AMBLER

Passed Assistant Surgeon, United States Navy  
(Medical Officer of the Arctic Exploring Steamer Jeannette)

# U. S. NAVAL MEDICAL BULLETIN.

VOL. XI.

APRIL, 1917.

No. 2

## SPECIAL ARTICLES.

### THE INTRAVENOUS ADMINISTRATION OF CONCENTRATED SOLUTIONS OF SOLUBLE QUININ IN MALARIA AND HEMOGLOBINURIC FEVER.

By A. D. McLEAN, Surgeon, United States Navy.

On May 25, 1916, an outbreak of malaria and blackwater fever was reported as being present among the United States marines stationed at Cape Haitien, Haiti, and vicinity, and the U. S. S. *Solace* was ordered to proceed for duty to the above-named place.

The *Solace* remained on duty in the vicinity of Haiti and Santo Domingo from June 2 to September 4, and during that time received on board for treatment 6 cases of blackwater fever and about 30 cases of malaria.

Of the blackwater-fever cases, three were convalescing when brought on board; i. e., the urine was free from hemoglobin, blood cells, and bile pigment, but they still were running slight daily temperatures. The other three cases, one of which had shown hemoglobinuria for the first time only 14 hours previously, were in the acute stage when received on board and typical in every respect of the disease. The blood in one of these cases showed a small ring-form infection.

In the straight malarial cases the diagnoses were confirmed by blood examinations, except in two cases, and most of these infections were benign tertians.

In five of these cases, according to entries made in health records prior to their transfer to the *Solace*, the malignant tertian organisms were found, but as they all had received considerable quinin by mouth or intramuscularly before arriving on board our laboratory was unable to find the subtertian organisms in the peripheral circulation.

Some of the cases were of comparatively recent infection, but most of them were of long standing and in a very much run-down condition.

The use of soluble quinin in concentrated solution—i. e., 1 grain to 1 mil of sterile water, intravenously—was suggested to me by Surgeon Raymond Spear, United States Navy, while the *Solace* was at



Guantanamo Bay in September, 1915, and after several talks with him as to dosage, method of administration, and results I decided to try, at the next opportunity, the concentrated solution intravenously as used by Dr. Spear. This did not occur until six months later, when the *Solace* was again in Guantanamo Bay with the battleship fleet, when three cases of malaria, of recent infection and which blood examinations showed to be benign tertians, were treated with excellent results, but as these were not chronic or malignant tertian cases sufficient experience was lacking at that time to make one feel assured that this was the method par excellence.

Since that time about 400 intravenous medications, using the concentrated solution, have been given on board the *Solace* with excellent results and without a single unfavorable reaction, drawback, or the slightest indication of danger. Some of the cases were severe infections of many months' standing, and the patients being very anemic, weak, and cachectic in appearance, it was thought a solution of quinin into the vein might in them cause some shock or collapse, but upon administration this did not occur.

Very little has been written in favor of the intravenous method of giving quinin, and many writers caution against the danger of its causing hemolysis. Careful daily urine examinations were made in these cases and if any indication of hemolysis was noted it was so slight that the liver amply cared for it, as no indications appeared in the urine.

Systematic blood examinations were made at set intervals and at no time was there the slightest indication of damage to the red cells; instead, the red-cell count showed an early increase in all cases after very few injections. One patient, who arrived on board with a red-cell count of 3,700,000 and hemoglobin 70 per cent, owing to the previous duration and severity of his infection, was given daily intravenous injections for over one month, although the temperature remained normal after the third day, and at the termination of injections his red count was 5,200,000 and hemoglobin practically normal. This would exclude any hemolysis.

Contrary to the instructions and cautions in most textbooks on tropical medicine, quinin intravenously was freely given in these cases of blackwater fever regardless of the absence or presence of malarial organisms in the blood, also regardless of the time or stage in the disease provided proctoclysis, sodium bicarbonate, or saline transfusion was used in conjunction with it to counteract dehydration, acidosis, or decreased urine elimination due to excessive and continued vomiting, which is characteristic in the acute stage. Most beautiful results were achieved, the hemoglobinuria clearing up within 60 hours after the first treatment, and temperatures which had been present for weeks dropping to normal in two or three days.

It may be premature to draw conclusions regarding the intravenous method in the treatment of blackwater fever based on six cases only, but the fact remains that the results obtained on the *Solace* were most gratifying and rapid and five of the patients were returned to duty in the Tropics in about eight weeks from the time they were admitted on board for treatment. The sixth, who was received just prior to the ship's sailing for the United States, was convalescing when brought on board and was transferred to a naval hospital upon our arrival in the United States to complete his convalescence. Previous to transfer this case received 11 intravenous treatments.

*Dosage and preparation.*—When giving quinin intravenously two solutions or methods may be used, viz, the concentrated and the dilute. The concentrated solution was the one used on board the *Solace* and is considered the method par excellence for reasons which will be mentioned later. This solution contains 1 grain of soluble quinin, preferably the chlorhydrosulphate, to each mil of sterile water, and 10 mils or 10 grains are injected at each dose. Sometimes 15 mils or 15 grains were injected at each dose, but as a rule 10 grains was considered sufficient for ordinary cases. The solution is prepared as follows: Use sterile water and make up the amount desired, allowing for loss when removing air bubbles at time of loading syringe; filter; autoclave for 20 minutes at 15 pounds, or use any sterilizing method available; when cool the solution is ready for use. Make up fresh solution each day.

*Method of introduction.*—Paint forearm with iodine wherever suitable veins are present; have assistant place rubber tourniquet around arm; when vein is suitably distended introduce needle and when blood flows freely through needle connect syringe which has previously been loaded; release tourniquet and gradually inject solution. An ordinary 10 or 20 mil record syringe with suitable needles, long ones of small caliber being preferable, gives the best satisfaction. It is needless to state that sterile gloves must be worn and aseptic technic adhered to in any intravenous medication.

*Immediate effect.*—The majority of patients first feel a slight burning sensation in throat, rapidly followed by slight cough and a hot feeling in the lungs which quickly passes to all parts of the body, giving the sensation of having a fever. Quickly following this they feel a bit dizzy and occasionally have a very mild transient syncopal attack which rapidly disappears and leaves them slightly dizzy for about five minutes, after which they get up and about and no longer feel any effects from the medication. The pulse becomes slightly accelerated and remains so until the medication is discontinued. Very seldom does it cause any nausea and, if so, it is only during the first two or three treatments in an acute case with considerable fever,



which case usually does have a little nausea to begin with. Rarely does a patient notice any headache or buzzing in the ears, and if so it is very mild and of short duration. The convalescent patient always came to the ward dressing room for his daily injections, which were given with the patient sitting in a chair. Afterward he was made to lie down in a bunk for 10 minutes before going up on deck or about the ship.

Most patients were given two treatments daily, 9 a. m. and 7 p. m., for 4 or 5 days, then one medication per day for 10 days more when it was discontinued, for by that time it was considered that the patient's system was entirely free from malarial organisms. No other treatment was used in these cases except the giving of an appetizer before meals, and iron and arsenic tonic after meals, and attention to the various channels of elimination.

As quinin was not given by the mouth the appetite quickly returned, convalescence made rapid progress, and the gain in weight in some cases was remarkable. Of course the cool sea breezes on board the *Solace*, and the mental relief from monotonous hiking and garrison duty in the Tropics no doubt had a very beneficial influence in hastening convalescence.

Owing to a desire to keep these patients under observation as long as possible in order to determine the full and lasting results after the injections had been discontinued, and, owing to the lack of transportation to return them to duty in their various commands which were stationed in different parts of the island, the majority of these patients remained on board the *Solace* about two months before being returned to duty and none of them had a recurrence of malaria after the treatment, which took about 10 or 15 days, was discontinued.

Just how many injections are necessary to free the system from malarial organisms, I am unable to state, for absence of temperature and organisms from the peripheral circulation is no sure evidence that the patient's blood or system is free from the infection, for we all are familiar with the quiescent periods in some cases of malaria which may extend over long intervals, until, from some marked change in temperature, fatigue, prolonged chilling of body, or other causes which lower resistance, the symptoms suddenly reappear. Probably seven or eight injections are sufficient to free the patient's system from malaria, but in order to be on the safe side, and, as the administration is most simple and causes little if any discomfort, about 12 to 20 medications, depending on the length and type of malarial infection, were always given.

In all, about 400 intravenous injections were given, each patient receiving, according to the severity, type, or previous duration of the infection, from 12 to 20 injections, and not in a single instance did



we have any unpleasant results such as painful or swollen arms or marked systemic reactions. Extreme care was always taken never to inject any of the solution outside the vein, but to make a second puncture if necessary, for the solution is very irritating when thrown into the tissues.

The results were beautiful. There was no temperature after the third day of treatment. There was not a single recurrence though many of the patients were under observation for nearly two months. Appetite quickly returned, early gain in weight occurred, and it was interesting to observe how rapidly some patients, after months of recurring attacks which had greatly debilitated and depressed them, took a new lease on life and regained their wonted vigor and tone.

The saving of suffering and discomfort to the patients was marked, for two days' treatment practically aborted the severest cases.

One can readily see the far-reaching effects of this treatment in an acute infection, for the cutting short and curing of an attack not only prevents resulting discomfort and disability and often invaliding home, but also saves a great deal of time and economizes services which in any military organization would be a most important factor during hostilities.

From results obtained on board the *Solace* I am inclined to feel that the use of concentrated solutions of quinin intravenously is as marked an advance in the treatment of malaria as salvarsan is in many cases of syphilis and the results are fully as spectacular.

This method is considered far superior to using the dilute solution of 200 or 250 mils for the following reasons: Mildness of reaction; ease of preparing and sterilizing the solution owing to its small volume; simplicity and quickness in administering, for on board the *Solace* intravenous injections were often given as rapidly as 10 in 20 minutes to convalescing patients, about 2 minutes to each case, though the bed cases took slightly longer.

In my opinion it is by far the safest method when administering quinin intravenously for it prevents collapse, shock, and other alarming and unpleasant symptoms such as one often sees when the dilute solution of 200 or 250 mils is used on patients debilitated from long continued malarial attacks.

The dilute solution contains, according to the dose desired, 10 to 15 grains of soluble quinin to about 250 mils of sterile normal salt solution and is introduced into the vein as is a solution of salvarsan.

From past experiences I am convinced that in order to prevent alarming reactions in debilitated patients, quinin intravenously must be given in concentrated solutions, i. e., 10 to 15 mils, and not in dilute solutions of 200 to 300 mils. From the unpleasant reactions which I have seen from the use of dilute solutions I would advise strongly against their use, especially in the debilitated.



The experiences of some naval medical officers in Haiti in the intravenous use of dilute solutions of quinin have been very unpleasant and I understand the method has been abandoned by them on account of the alarming reactions following its use.

Just why the concentrated solution has such a marked advantage over the dilute solution as regards systemic reaction I am unable to explain, but I do know that such is the fact, for the latter has a marked tendency in many cases, especially the debilitated, to cause alarming symptoms such as collapse, shock, etc.

We all are familiar with the unpleasant features, drawbacks, slow results, and, in many cases the ineffectiveness, of quinin when administered by mouth, especially in the malignant types.

Quinin intramuscularly has several features for condemnation, and at best it is slow and uncertain. Some of the patients who had previously received intramuscular injections of quinin before being transferred to the *Solace*, arrived on board with abscesses from the same, while others still had painful lumps at the points of injection indicating nonabsorption. Abscesses and painful lumps will often follow the intramuscular method in debilitated patients with long standing malarial infection regardless of the perfect aseptic technic used, for the tissues, in many of these cachectic cases with a lowered resistance, are not able to handle this foreign irritating solution and a hard lump or abscess often follows.

Some who use the intramuscular method advocate using rubber-dam tissue as a preventive against abscesses, their theory being that the infection is from the outside and follows down the irritation set up along the needle track from the irritating quinin solution which is distributed along the track, coming from any of the solution which may have been on the outside of the needle at the moment of introduction. The skin is painted with iodine, a small piece of rubber dam is laid over same, and the needle is plunged through the rubber dam into the tissues, thus eliminating any quinin solution which may have been on the outside of the needle.

CONCLUSIONS.—1. In malaria and blackwater fever the use of concentrated solutions of quinin intravenously is the method par excellence.

2. Quinin intravenously should be given in concentrated solutions, i. e., 10 to 15 mils, and not in dilute solutions of 200 to 300 mils.

3. Under ordinary precautions and sterile technic the concentrated solution is practically free from danger.

4. As regards systemic reaction it has many advantages over the dilute solution.

5. In results this method has many advantages over any other method of giving quinin in malaria.

6. In some cases the use of the dilute solution is dangerous.

7. The intramuscular method has many objectionable features.

8. By the use of the concentrated solutions the attack can be cut short and terminated, the patient saved much suffering and discomfort, and in a military service much saving of money, time, and services to the government can be made.

9. The results obtained are sufficient to make one feel that it is not only a safe method but by far the quickest and surest way of eliminating the malarial organisms from the system.

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#### REPORT OF CASES OF HEMOGLOBINURIA IN HAITI.

By R. A. TORRANCE and F. H. BOWMAN, Assistant Surgeons, United States Navy.

There is a great diversity of opinion as to the etiology of hemoglobinuria occurring in tropical countries. Leishman advanced the theory of certain cell inclusions, which he thought to be of chlamydozoal nature, as the etiological factor. Veretas in 1858 was the first to attribute the hemoglobinuria to quinin, supported later by Tomaselli, Grocco, Plehn, Koch, and others. Sambon, owing to its clinical similarity to certain hemoglobinuric diseases in cattle, thought that it might be caused by a piroplasm. In Castellani and Chalmers' Manual of Tropical Medicine they definitely divide tropical hemoglobinurias into three classes: Malarial hemoglobinuria, quinin hemoglobinuria, and blackwater fever. The latter they define as "an acute specific fever of unknown causation, characterized by great blood destruction, jaundice, and hemoglobinuria." This gives us a practical working classification and yet leaves open to investigation those obscure cases apparently without malaria or quinin as the definite etiological factor. Our cases occurred in individuals who had had repeated attacks of malaria, who were doing the most arduous and strenuous duties, often hiking in heavy marching order 18 to 25 miles per day under a tropical sun. We considered these cases to be malarial in origin and so treated them.

The attacks appeared within 24 hours after the completion of a hike, when the men's resistance had been lowered by the march with its accompanying exposure to tropical sun or rain. The onset is sudden, ushered in by a well-marked chill, thus differing from the majority of subtertian cases, where only chilly sensations, or at most a mild chill, are to be expected. Prostration is marked. The cases resemble very closely a severe hemorrhage. The pulse is rapid, varying between 100 and 120 or 130, and the patients are very pallid. Nausea is pronounced from the start, quickly followed by vomiting, first of food and then of bile. This usually continues throughout the febrile period and is very difficult to control.



The liver and spleen are enlarged and tender; the latter is usually at least a hand's breadth below the margin of the ribs. Owing to the very rapid destruction of red blood cells, the liver is unable to destroy the large amount of hemoglobin and as a result icterus appears within the first few hours. Although this was a constant symptom, yet it was as a rule not very intense. The patients were far less jaundiced than those suffering from bilious remittent fever. The skin is hot and dry, rapidly becoming tinged with yellow, and very pale, due to the pronounced anemia. The conjunctiva is yellow. Itching was never complained of.

The fever course was very similar to that of estivo-autumnal malaria, having a tendency to exhibit a continuous or at least a remittent curve for a few days, then dropping to subnormal and remaining there for several days. The latter was a very pronounced and constant feature. The amount of hemoglobin in the urine seemed to bear a more or less definite relation to the temperature, appearing and continuing, when the temperature was elevated, and diminishing as the temperature approached the normal. In two cases this was beautifully shown. During the initial febrile period the urine remained dark in color, clearing up as the temperature dropped to subnormal, to become dark red during a secondary rise of temperature.

The most striking feature, and the one from which the disease derives its name, is the color of the urine, varying from reddish to almost black. Red cells are not found. It is a true hemoglobinuria and not a hematuria. Albumin and casts are found in the urine. Owing to the large amount of hemoglobin passing through the renal tubules there is a distinct tendency for them to become blocked. The urine as a result is scanty in amount and anuria is greatly to be dreaded.

Rapid and marked anemia is a constant factor. In one case the red count dropped to 2,200,000 in the first 24 hours of the disease. The percentage of hemoglobin reduction runs parallel with the reduction of red cells. The blood is thin and tinged with pigment. In one case it was impossible to make a satisfactory smear. A marked symptom, after the subsidence of the fever, is the intense weakness. This is extreme in the severe cases and it is weeks before the patient is able to be about. Even in the mild attacks the weakness is out of all proportion to the severity of the disease.

*Case 1.*—G. R., sergt., U. S. M. C., aged 38. One year's continuous service in the Tropics and a history of several previous attacks of malaria.

Attack began with severe chill followed by fever, with some nausea. Patient was not seen by surgeon until following day. Temperature, 100.4°; spleen palpable and tender. Microscopic examination not

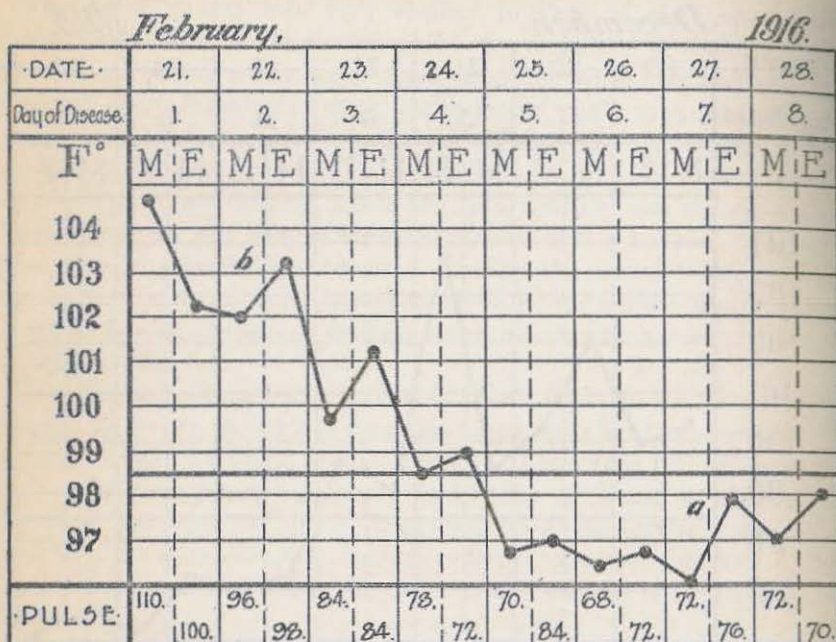




*Case 2.*—L. A. J., pvt., U. S. M. C., aged 20. History of attacks of malaria before entering the service. Tropical duty 6 months.

Attack began with chills, malaise, and sudden elevation of temperature to 104.6°. Complained of supraorbital pain. Spleen not palpable. Urine normal.

The following day temperature dropped somewhat (102.4°), but patient complained of pain in back and of being very weak. Marked anemia, no jaundice. Urine red in color, no albumin or bile pigments. Hemoglobin 70. Quinin, which had been started (45 grains per day), stopped. Malaria parasites present in smear.



Case 2. *b*—Hemoglobinuria; stopped quinin. *a*—Quinin sulphate, gr. 15; Fowler's solution, gtt. 3, t. i. d.

Temperature 100.2° following day. Urine showed pronounced hemoglobin and trace of albumin. Hemoglobin, 60.

From then on he continued to improve, although very weak and anemic. Able to sit up on sixth day and started on regular Canal Zone treatment.

This was a very mild case.

About two months after this he had an attack which began very much in the same way, although at this time he had a typical dengue (or three-day fever) eruption, and the other clinical signs of dengue. His blood was positive for malaria, however, and he was again placed on quinin treatment. At no time after his first attack did he show any hemoglobinuria.

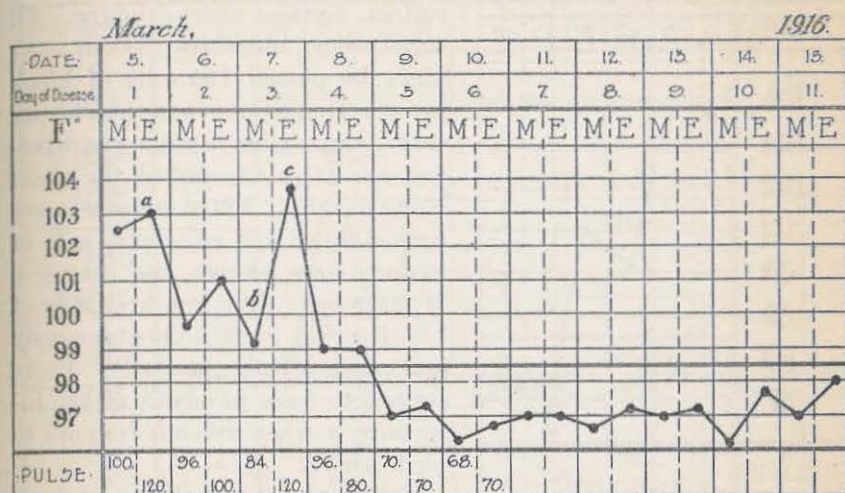


*Case 3.*—G. A. D., pvt., U. S. M. C., aged 24. One year's continuous tropical service. History of previous attack of malaria.

Complained of chills, fever, pain in abdomen, and weakness. Temperature  $102.4^{\circ}$ , pulse 100. Given magnesium sulphate and put to bed. Started on quinin treatment.

Following day no relief. Complained of marked abdominal pain and distress over umbilicus and of gas. Palpation showed no local points of tenderness but much distention from gas. Enemata gave only temporary relief. Bowels moved only on medication and showed much mucus but no blood. Urine negative for albumin and bile pigments, but dark red (smoky) in color. Quinin stopped.

The following day temperature was  $104^{\circ}$ , pulse 124, abdominal pain and nausea intense. No vomiting; no jaundice; urine porter color.



*Case 3.* *a*—Quinin, gr. 15, t. i. d. *b*—Hemoglobinuria; stopped quinin. *c*—Sodium bicarbonate enemata.

Temperature fell almost to normal next day and patient much better. Abdominal distress gone, but abdomen tender. Urine clearer. Patient feels well but very weak.

*Case 4.*—P. M., French priest, aged 56. Had lived in Haiti 13 years and had had numerous attacks of malaria, and stated that he had passed black water during several of these.

Complained two weeks prior to attack of slight fever, malaise, and constipation.

Attack began while he was up in the mountains, and he was brought to town on a mule. Complained of no chills and of only a moderately high fever; no pain, but said he was pretty well knocked out. He was seen on the night of the second day. Spleen reached almost to umbilicus; constant vomiting of large quantities of bile-colored fluid; much prostration and marked anemia; jaundice marked. Urine

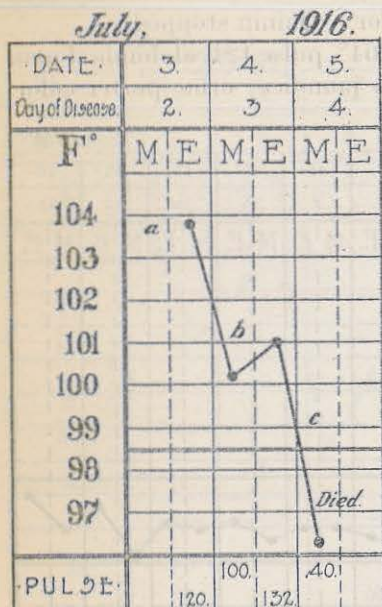
black and scanty in amount. Only on high dilution could the red color be brought out. Hemoglobin 60. No malarial parasites in blood. Temperature 103.6°, pulse 120, but strong and regular. Mind clear and cheerful.

He had been taking quinin, 30 grains per day. Quinin stopped and every effort made to keep bowels free and kidneys in action by hot fomentations, alkaline waters, and saline enemata.

The following day temperature dropped to normal and below, and patient worse. Jaundice pronounced, patient very weak and suffering

from much retching and vomiting. Passed no urine during the night. Pulse weaker and up to 132; mind somewhat clouded. Given caffeine, 2 grains every 3 hours. All supportive measures taken. At night he passed 150 mils of black urine. Hemoglobin less than 20 per cent. Impossible to make a satisfactory smear on account of the blood being so thin. Smear showed many broken-down red cells and reds of various sizes, shapes, and intensity of staining. Five hundred mils of blood serum given subcutaneously and enteroclysis started. There seemed to be a paralysis of the intestines, as they did not respond to medication.

Following day pulse was very feeble and irregular, intense jaundice, hiccough, and coma. Death occurred that evening.



Case 4. *a*—On admission had been taking 30 gr. of quinin a day. *b*—Hemoglobinuria, 150 mils in 24 hours. *c*—Axillary temperature.

Case 5.—G. E. D., Pvt., U. S. M. C., aged 20. About one year's service in tropical countries. History of previous attacks of malaria.

Attack began with distinct chills. Temperature 102.6°, pulse 120. Some nausea, no vomiting. Patient sent to hospital on second day, where he ran the usual course for this condition. This case showed a blood count of 2,200,000 within 24 hours after admission. Temperature chart is fairly typical of a moderately severe attack.

Case 6.—R. M., Pvt., U. S. M. C., aged 22. One year's service in Haiti. Eight previous attacks of malaria.

Attack began with a chill. Temperature on admission 103.8°. Spleen and liver palpable. Urine dark red in color. Markedly prostrated; vomiting and nausea.







Sixth and seventh days, temperature remained subnormal. Quinin in 5-grain doses continued. Urine normal in color and amount.

On the eighth day the temperature came back up to  $104.2^{\circ}$ . Urine once more dark red and very much lessened in amount. Quinin, 45 grains, given in divided doses intramuscularly.

Temperature on the ninth day  $101^{\circ}$ . Quinin given by mouth, 5 grains every two hours, until 45 grains had been taken. Urine lighter in color.

Tenth day, temperature subnormal. Urine cleared up to a marked degree. Quinin continued by mouth.

The regular Panama treatment was then started and continued until patient was transported to the base hospital, two weeks later.

*Case 7.*—T. A. K., corpl., U. S. M. C. Had six previous attacks of malaria. A severe chill ushered in the attack. Temperature on admission  $103^{\circ}$ , rising rapidly to  $106.6^{\circ}$ . Spleen and liver palpable. Patient rapidly became jaundiced; nausea and vomiting of bile pronounced. Soapsuds enemata given. Urine dark red in color. Alkaline treatment, as above, begun at once. Owing to the high temperature, it was decided to start quinin at once. Injected 15 grains intramuscularly every eight hours. No urine passed for 18 hours.

The following day the temperature dropped to  $102.8^{\circ}$  in the evening. Urine passed in 24 hours, 600 mls, dark red in color. Nausea and vomiting continued.

Third day the temperature was subnormal; the urine began to clear and to increase in amount. Quinin, 5 grains every two hours until 45 grains were taken. Slight nausea.

On the fifth day the patient was transferred to the hospital.

*Case 8.*—J. McD., Pvt., U. S. M. C. Patient had been in Haiti for a year. Ten previous attacks of malaria.

Admitted with a temperature of  $103.8^{\circ}$ ; nausea and vomiting. Urine dark red in color. Pulse 120, liver and spleen palpable. Alkaline treatment.

Next day temperature rose to  $106^{\circ}$ , pulse 128; urine dark red in color, scanty in amount, 460 mls passed in 24 hours. Quinin, 45 grains, given intramuscularly in three doses. Much jaundice.

The following day temperature dropped to  $100.8^{\circ}$ . Urine very much lighter and increased in amount. Quinin, 10 grains, given three times a day intramuscularly.

On the fourth day temperature dropped to normal. Urine almost normal in appearance and amount. Quinin, 5 grains, taken by mouth three times a day.

Fifth day temperature rose to  $104^{\circ}$ ; urine once more became dark red in color. Quinin, 45 grains, in divided doses.

Sixth day, temperature dropped to subnormal. Panama treatment started; quinin given by mouth. Urine dark amber.

Two weeks later patient was transferred to the hospital. No recurrence of hemoglobinuria or fever during this period.

The other five cases seen at Fort Liberty were treated with quinin from the start and all traces of hemoglobin in the urine disappeared within four days after the temperature became normal.

It is to be regretted that more data could not be collected on these cases, but the opportunity for properly following through a case is very limited in the field, where no laboratory facilities are available. As a consequence, practically all these observations have been clinical.

**TREATMENT.**—Owing to the lack of unanimity of opinion as to the advisability of giving quinin during an attack of hemoglobinuric fever, the first five cases were not given quinin after the diagnosis had been established. It is to be noted that the one fatal case out of the thirteen reported occurred among these early cases. It is true, however, that this case was a poor risk, as he was a man well along in years, had lived thirteen years in Haiti, and had a history of previous attacks of blackwater fever. The next case, under the usual expectant treatment, did not respond, and his condition became so critical that quinin was used. No ill effects were experienced from its use and the patient made a good recovery. In the remaining cases quinin was given at once, but only in sufficient quantities to control the temperature until the disappearance of the hemoglobinuria, when the regular Canal Zone treatment was started and did not produce a return of that condition.

Owing to the nausea, quinin can not be given by mouth during the early stages. Intramuscular injections of quinin seem far more efficient than like amounts taken by mouth. There is always danger of infection unless one is very careful in his aseptic technic, for the inflammation about the site of injection makes conditions almost ideal for bacterial growth, especially dangerous in Haiti, where tetanus is extremely common. We were very fortunate in this respect, getting no infections in a series of over three hundred injections given for malignant types of malaria. Owing to the fact that most of our cases occurred in the field, where it was impossible to obtain adequate facilities for intravenous work, we had to use intramuscular injections. Dr. E. U. Reed, at Cape Haitien, obtained brilliant results through giving quinin intravenously.

Absolute rest in bed is essential. Our patients were not allowed to make the slightest exertion if it could be avoided. A thorough cleansing of the bowels is essential; calomel, followed by salts if possible, or if the nausea would not permit of taking anything by mouth, a soapsuds enema. Ice was an unknown luxury in our districts, which added quite a little to the other difficulties. As soon as possible the patients should be given a light nourishing diet, for



their condition is asthenic from the start and convalescence is prolonged.

Large amounts of water containing thirty grains of sodium bicarbonate to the pint should be administered by mouth. If the vomiting will not permit this, good results will be obtained by using it per rectum after the Murphy drip method, or by injection of small amounts at frequent intervals. According to the best authorities there is a reduction of alkalinity of the blood in hemoglobinuric fever. Mac-Gilchrist's theory is that the hemoglobinuria is brought about by an acidosis coincidentally with a damaged liver, plus malaria, and the administration of acid salts of quinin. Therefore, the administration of alkalis is a thoroughly sensible therapeutic measure to combat the acidosis. It also tends to decrease the nausea.

Caffein, when stimulation was necessary, seemed to be of use, not only because of its action on the central nervous system, but also because of its diuretic action. Hot fomentations applied over the kidneys were used in an effort to increase the flow of urine.

CONCLUSIONS.—1. The cases with hemoglobinuria occurring among the marines in Haiti are malarial in origin.

2. These in their clinical course and laboratory findings are cases of hemoglobinuric or blackwater fever.

3. The most effective treatment, when the hemoglobinuria is due to malaria, is to treat the malaria with the one specific that we have for that disease, namely, quinin. It is far better to risk the chances of the slight hemolytic action of quinin than to risk the enormous destruction of red cells caused by the rapidly multiplying malarial parasites.

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#### QUININ AND MALARIA.

By W. H. MICHAEL, Assistant Surgeon, United States Navy.

If a practitioner, in whose clinic a case of malaria is unusual, should refer to his recent medical journals in order to give his patient the benefit of the last word in the treatment of his case, that practitioner might well conclude, from the articles he would read, that quinin is out of date and that it behooves him to use salvarsan old or new, X-rays of the spleen, or some other treatment. His patient may be cured. They were cured many years ago by methylene blue and many nonquinin-containing medicines, in fact the patient usually gets well without treatment, especially if he is kept in bed.

It is not intended to convey the impression that such drugs as neosalvarsan have no effect upon the malarial parasite, for the parasites have the same appearance after such administration as those seen after a dose of quinin, while improvement is noticed in the patient. In addition, the general tonic effect of the arsenical prepa-



rations is undeniable. It is considered, however, that arsenical treatment of malaria is still in the experimental stage, and its present reported results are not comparable with those obtained with the proper use of quinin. This statement is especially justifiable in that the greater number of cases reported, in which arsenical treatment was used, are of the benign tertian variety, the symptoms of which variety yield more readily to treatment. It may be added that this variety is especially adapted to such experimentation, since the patient can be treated when the temperature is not high; while even the most optimistic would hesitate to give a dose of salvarsan to a patient with a temperature above  $105^{\circ}$  and with no assurance that it will come down except after death. So up to the present it should certainly be considered that except in such cases where we can afford to temporize, the proper treatment for malaria is with quinin.

It is here intended to outline this treatment of malaria by quinin in such a way that it will not be undertaken half-heartedly; for much of the dissatisfaction that has been attributed to quinin is due to ineffective methods of administration. Quinin will cure the symptoms of malaria if the patient lives five days. He may die of black-water fever; but that will be touched on later. In the observation of at least 1,000 cases of malaria under quinin treatment, no cases of benign tertian have been seen to have more than one severe paroxysm of fever; and no case of malignant tertian has failed to reach a normal temperature by the end of a week. This statement is exclusive of three cases in which treatment was begun late in the disease, and who died in the first three days of treatment with high temperature and in spite of the heroic administration of quinin. In rather striking contrast to this series is one case of quartan malaria which, on account of a marked idiosyncrasy against quinin, was treated with arsenical preparations, including Fowler's solution and two full doses of salvarsan. The treatment was unsatisfactory, though there was some improvement, and the patient was at last sent out of the Tropics.

In undertaking the treatment of malaria it is important to keep in mind that quinin kills malarial parasites and that the body of our patient harbors those parasites and harbors them especially in the blood stream. The logical answer to the problem is to change the body, especially the blood stream, into a solution of quinin, sufficiently concentrated to kill the parasite without killing the body. In the failure to carry out this idea, or in producing below the lethal quinin solution for the parasite, lies one of the causes of failure in the treatment of malaria. On this basis the daily administration of a small (5-10 grain) dose of quinin as prophylactic is considered to be unjustifiable. Either produced as prophylactic or as treatment, a solution of quinin sublethal for the parasite in the body fluids can



have but the two effects that experience confirms—namely, a delay in the development of the disease while the parasite is becoming adapted to the unfavorable media, or quinin fast, and a case of malaria more difficult to cure when it does develop. An example of this condition will be given along with the quinin prophylaxis considered more logical.

To obtain in the body the required solution of quinin to kill the malarial parasite, it is found that the following routine treatment is sufficient for the average case of malaria of any variety. As soon as a diagnosis is made, a dose of 20 grains of quinin sulphate is given by mouth in capsules or any absorbable form. A dose of three grains of calomel is given, followed four to six hours afterward by an ounce of magnesium sulphate. Quinin is continued at the rate of 15 grains three times a day, or in more severe cases every four hours for three or four doses, and then three times a day, until the temperature remains normal for 24 hours. The dose is then reduced to 10 grains three times a day, which is kept up for three weeks of normal temperature and is stopped. The gradual reduction of dosage is not considered justifiable as being opposed to logical specific treatment. For the same reason, if a tonic as advisable, something which does not contain quinin is given.

It may be asked why the dose is reduced from 15 to 10 grains, or if the required quinin concentration can be obtained with the smaller dose, why give the larger? The answer is: First, that the required concentration of quinin is more quickly obtained by beginning with the larger dose, thus attacking the parasite before it becomes in the least quinin fast; second, that in the destruction of the parasite the drug itself may be used up; third, that a continued dosage of 15 grains is uncomfortable for most patients, while that of 10 is not.

With the unusual or more severe cases there are many emergencies to be met. A patient may vomit his quinin and everything else he takes by mouth; he may come in after a long illness with extremely high temperature, unconscious, and with convulsions. In such cases administration by mouth is both impractical and useless and the treatment is most effectively carried out by the intravenous method. An advisable combination for this class of cases is 15 grains of the chlorhydrosulphate of quinin in 750 mils of saline solution. This intravenous dose may be safely repeated after four hours, with the reduction of the quinin to 10 grains. The second dose may not be necessary, because in the majority of cases the severe and unusual case will have become an ordinary case and can be treated as such.

In place of the above treatment, which may be impractical at times, one of the following treatments may be administered, giving preference in the order named. First, injecting very slowly intravenously as little as 10 mils of sterile water (more if possible) con-



taining 8 grains of the chlorhydrosulphate of quinin, repeating this after an hour. Second, injecting intramuscularly 20 to 25 grains of the same salt followed by 10 minutes' massage of the part injected. Third, the administration of 60 grains of quinin salt in a quart of saline by rectum. All of these treatments may be repeated at intervals of four hours or until the ordinary treatment can be resumed. If either the first or second treatment is used it should be supplemented by a quart of saline by rectum. It is worthy of mention here, that all hydrotherapy applicable to other fevers is adaptable to malaria. The administration of large amounts of liquid by mouth, vein, or rectum according to opportunity is especially necessary in severe cases, as it is considered to keep the kidneys open, to help control albuminuria, and to prevent that most serious complication—blackwater fever. The patient should remain in bed throughout the febrile period of treatment, both because the treatment is rendered more effective and because it is considered that relapse is neither so frequent nor so persistent in patients so treated. The bowels should be regulated by an occasional saline. The diet is regulated by the fever itself though the patient should indulge no unnatural tastes. All other treatment as to stimulation, etc., is symptomatic.

Before leaving the treatment of malaria with quinin the old question of the administration of quinin in blackwater or hemoglobinuric fever must perforce be mentioned. In the event of this disease one thing at least is certain, hydrotherapy and elimination take first place and everything else a bad second. Incidentally transfusion might be given a trial in this disease. Ordinarily, it is considered best to begin treatment by the administration of a purge, a saline enema, and a quart of saline intravenously with from 7 to 10 grains of the chlorhydrosulphate of quinin. However, if the disease appears after quinin has been administered in doses already described for several days, if no parasites can be found in repeated examination, or if it is a case which has had the disease before, and the clinic and laboratory findings show that parasitic malaria is a secondary consideration, then quinin should not be given. In this malady the arsenical combinations may find a good place.

The last point in the treatment of malaria is its permanent cure. Those who have had the most experience agree that malaria can hold its own with syphilis in the uncertainty of a cure. The results of all treatments are difficult to judge on account of the fact that in the Tropics there is often no way of telling a relapse from a reinfection, while the tendency of all cases toward a permanent cure is increased on going to a cold climate. The treatment outlined above, which is practically that used in the Canal Zone, the confinement of the patient to bed during the febrile period of treatment, the



abstaining at all times from the use of doses of quinin sublethal for the malarial parasite, and careful hygiene, with tonics, after the immediate treatment, are the best factors we have toward the prevention of relapses. Some may believe that with the use of arsenical treatment relapses are less likely to occur.

The case already mentioned which arsenic failed to cure, and a case of relapse now under observation which received two doses of neosalvarsan during treatment in addition to quinin, certainly tend to prove the contrary. The relapse in the latter case is attributed to the violation of two of the factors mentioned above; namely, the patient was in the habit of occasionally taking a small dose of quinin, and a daily intravenous injection was substituted for the early part of the routine treatment suggested above. During this period of intravenous treatment it is easily conceivable that the quinin content of the blood would fall below the lethal solution for the parasite, and that during such periods some would sporulate and be able to continue the cycle. To begin all malarial treatment by an intravenous injection certainly has a logical basis, for by that method a lethal solution for the parasite is most quickly obtained; but, though no laboratory proof is at hand for this particular drug, it is reasonable to suppose that the quinin content of the circulation falls more quickly after the immediate absorption of intravenous injection than after the more gradual absorption when given by mouth. Therefore, though by intravenous method the lethal solution for the parasite is more quickly obtained, frequent intravenous treatments being impractical, that lethal solution is more readily maintained by administration by mouth. It must be remembered that the parasite is most affected by the drug at certain stages in its cycle of development and that the drug must be always effectively present to attack every parasite as it reaches its vulnerable stage, until all the asexual parasites are killed and the sexual ones are either killed or disappear. It is worthy of repetition that the intravenous injection is ideal to begin with, and to be used until it is practical to give quinin by mouth; but the maintenance of the required quinin solution in the body for a period sufficient to cure the disease can only be practically carried out by administration by mouth.

A rare but difficult problem arises in those cases which have an idiosyncrasy against quinin. In those rare cases, when the patient's life is in no immediate danger, an arsenical preparation would be advisable. If, however, the attack of malaria is serious, the following procedure is mentioned as being in line with the theory of anaphylaxis and as having given satisfaction in one case. A small dose of quinin was given by mouth which produced the anaphylactic reaction. After the symptoms had passed their height, which was about an hour, an intramuscular injection of 25 grains was given without any



further anaphylactic effect. In fact, the patient thought that the hypodermic was something to stop his discomfort. In cases of this kind intravenous injection is considered dangerous on account of the immediate absorption. It is useless to add, that the individual with an idiosyncrasy against quinin should not remain in a malarious district, or if of necessity there, he should carry out the most rigid self protection against infection.

This leads to the last and an important point in the use of quinin in malaria, that of quinin in prophylaxis. As previously stated the small daily dose now most commonly in use is both illogical and unsatisfactory. Nevertheless quinin has an important place in malarial prophylaxis of the individual only second to personal protection against the mosquito. The method which has personally given the greatest satisfaction is the administration of three large doses whenever there is the slightest symptom of the presence of the disease. Fifteen grains of quinin are given at noon, 20 at night, and 15 the following morning. It is best to precede the treatment by a purge. This treatment should be given at intervals of one week, preferably Saturday night and Sunday, to men who are known to be continually exposed to the disease in a malarious country. In fact it was first noted as being the method used by a foreman doing field sanitary work in the Canal Zone who was proud of the fact that he had not had malaria in spite of long constant exposure. The method has given great satisfaction on at least one occasion, and its use is especially urged on similar occasions. A section of about 50 men had just returned from a month of campaigning in a malarious district, during which time 5 grains of quinin were given daily according to the regimental order. Ten grains of quinin were given personally during the last four days of the campaign. On return the latter dose was continued, in spite of which 6 of the 50 were admitted for malaria in the first week after their return. These cases gave a total of 32 sick days or an average of over 5 days per case. The days of sickness are mentioned as being important, bearing upon the comparative curability of the disease after daily doses and after the method here advocated. On the seventh day the above treatment was given and during the next month there were no admissions for malaria among these men in spite of the fact that all quinin was discontinued after the above treatment. Since the above method has been adopted, the average of sick days for malaria per case has been less than two days. The number of admissions have been small, but this might be explained by the fact that the post is comparatively healthy.

In places such as mentioned above, where malarial infection is not frequent, it is not considered justifiable to give this prophylactic treatment every week. It has proved satisfactory to tell those to



come in for treatment who have headache or pains in the body. If on examination the symptoms are considered malarial, the treatment is given. This idea has been successfully followed for a year, and results have warranted the experiment. This prophylactic treatment has advantage over the small daily dose method, in that it is theoretically more correct; it is more effective in preventing malaria, as exemplified in the example above; it is not so likely to interfere with laboratory diagnosis; if the disease develops, it is more quickly cured as shown by the average of five sick days compared with two sick days under the same methods of treatment; it is less conducive toward relapse, as it does not produce quinin-fast parasites; and it can be more easily and carefully given, as it is only necessary once a week at most.

In summary I have attempted to show that, first, the usual routine and effective treatment of malaria is by obtaining a quinin concentration in the body lethal for the parasite, and maintaining that concentration until the disease is cured; second, that doses of quinin which produce a sublethal solution for the parasite in the body should never be given; third, that internal hydrotherapy is an important factor in the treatment of malaria; fourth, that as prophylactic an occasional day of active treatment is more effective and convenient than the method of small daily doses.

In conclusion it is important to state that the ideas presented above have their primary basis in somewhat extensive tropical experience, while the theory is more the result of an attempt to explain a practice which has worked out satisfactorily.

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#### MECHANICAL DEVICES FOR VENTILATION AND AIR RENEWAL ON THE SUBMARINE "BALILLA."<sup>1</sup>

Translated by J. S. TAYLOR, Surgeon, United States Navy.

The *Balilla* is a double-hulled craft which, when submerged, displaces 1,200 tons. It has a length of 65 meters and is propelled by two screws driven by combustion motors and electric motors.

On the fairly spacious superstructure deck rises the conning tower provided with two periscope tubes, and four hatchways afford exit to the open for the crew.

The hull is transversely divided into seven habitable spaces by means of eight water-tight bulkheads, and adjacent compartments communicate by means of an elliptical opening which can be closed by a double water-tight door.

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<sup>1</sup> Dr R. Marantonio, major, Medical Corps, Royal Italian Navy. *Annali di Medicina Navale e Coloniale*, July-August, 1916. The author's preface is omitted. In it he refers to the work of Belli, Tracello, and Olivi on submarines: Justifies his brief description of the *Balilla* on the ground that vital hygienic principles for the benefit of those who live at sea are not the property of any flag or nation and should not be kept secret.



The seven habitable spaces, where are installed by ingenious but complicated arrangement the delicate engines, the powerful machinery, the intricate system of piping, are divided horizontally by floor plates into two stories—that for thoroughfare and that for the bilges.

The space between the two hulls is for the free circulation of sea water in the upper division; the lower, which is water-tight and separated into compartments, constitutes the trimming tanks used in emerging and submerging.

The free habitable space within the strength hull (including conning tower, etc.) has in all a cubic air space of 567 cubic meters which, for the actual complement of 36 men, represents not more than 15.5 cubic meters of respirable air per individual.

Analogously to what takes place on board every other submarine the causes of vitiation of respirable air are:

1. Withdrawal of oxygen, increase of carbonic oxid, humidity, temperature, and production of harmful exhalations through the presence of living beings on board.
2. Rise in temperature due to machinery in motion and to illumination.
3. Production of noxious gases from storage batteries and combustion motors.

While the various open spaces of the vessel are in communication with each other, they are not all equally subject to the causes of air vitiation owing to differences in cubic space, in the number of men occupying them, and in the distribution of apparatus and engines.

Uniformity of atmospheric conditions in the various spaces is brought about by—

(a) The mechanical device for the circulation of air throughout the vessel.

The vitiation of respirable air is remedied by—

(b) The expulsion of vitiated air and the substitution of new air drawn from without or derived from a supply of compressed air.

(c) The regeneration of vitiated air through absorption of carbonic oxid and moisture and the replacement of consumed oxygen.

**NATURAL VENTILATION.**—This may be secured when in port through all the apertures of the superstructure deck and during mild weather, especially with the aid of the wind, an ample renewal of air within is assured by it.

It is not sufficient, however, when in a mild, warm climate or during a state of atmospheric calm, the renewal of vitiated air does not take place and the inconvenience of spaces overheated through illumination and the running of machinery is not reduced.

When cruising on the surface it is necessary for obvious nautical reasons to limit the openings on deck; the motors for propulsion are

in action and the conditions for breathing in the compartments are still more unfavorable.

It may be concluded therefore that on board a submarine the facilities for natural ventilation are wholly negligible and that artificial or mechanical ventilation is a constant necessity.

Of course, when in port or running quietly on the surface the crew can derive great benefit from coming out and staying on deck.

**ARTIFICIAL VENTILATION.**—On this vessel we have to consider various devices for artificial ventilation, some being *direct*, because designed wholly to renew air for breathing, others being *indirect*, because they are derived from the necessity of having ventilation for the machinery. There remain those methods which might be termed illusory and are limited in their contribution to ventilation to the simple circulation of air through all parts of the vessel. In the matter of these various mechanical devices therefore it is interesting to study the ways and means for artificial ventilation on board beginning with an examination of the—

*General ventilation system.*—I refer only to that whose special function it is to circulate air through all the inhabited spaces of the vessel. (Fig. 1.) It consists of a girdle or circuit of piping which traverses at the height of a man's head all the vessel's habitable interior, making a complete circuit thereof either fastened to the bulkheads or suspended from the frames, and barely recognizable in the complexus of the thousand tubes which accompany it.

It consists of a metal tube of about 10 cm. diameter which in each compartment presents two openings, at opposite points, to right and left respectively, of the locality, which can be closed by screw-down valves.

Corresponding to each bulkhead is an intercepting cut-off valve. At the extreme bow and stern the circuit can be interrupted by a butterfly valve, thus creating a right and left ventilating arm.

At each extremity of the vessel (torpedo-firing compartments) there is an electric blower *TC* and *TC'* connected with the circuit. The one astern, which is on the left branch or arm of the circuit, acts as an exhaust while the one at the bow on the right acts as a supply. The complementary action of these two blowers operates at the expense of the compartments in which they are situated. Thus the blower in the forward torpedo-firing room sucks air from the compartment and into the tube, while the after blower operates in an opposite manner.

If we assume that the two hatches at the extreme ends of the deck are open we will have aspiration of outside air through the bow hatch and entrance of air through the openings in the right-branch piping, while the after blower will aspirate air from all the compartments through the openings in the left-branch piping and will expel it



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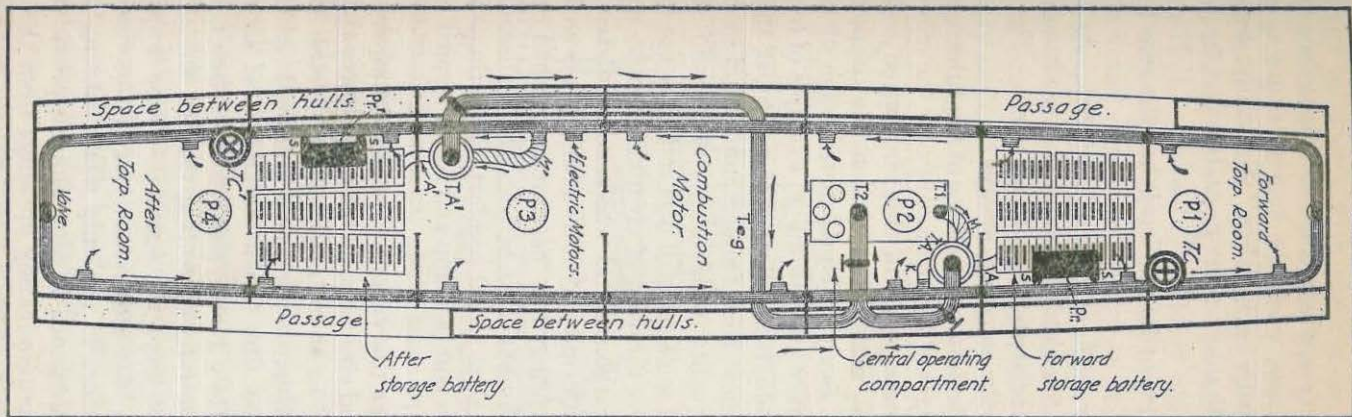


FIG. 1.—DIAGRAM OF THE GENERAL VENTILATING SYSTEM (AIR-CIRCULATION GIRDLE) AND OF THE EXHAUST SYSTEM FOR GASES FROM THE STORAGE BATTERIES.

Forward torpedo room: 92 cu. meters; 14 men. TC=blower. P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub>, P<sub>4</sub>=hatchways.

Forward storage battery room: 79.700 cu. meters; 3 men. Pr=air-purifying battery. A=exhaust pipe; also attachable to M.

Central operating compartment: 43 cu. meters+7 cu. meters; 5 men. TA=Turbine blower for exhaust of storage batteries. M=Sleeve for connection with periscope T<sub>1</sub>. K=Sleeve for connection with general piping system. T<sub>2</sub>=After periscope tube.

Combustion-motor room: 131.500 cu. meters; 3 men. T.e.g.=Exhaust piping for gases from storage batteries, which does not traverse combustion-motor room, but runs in the upper part of the space between the hulls.

Electric-motor room: 81 cu. meters; 4 men. TA<sup>1</sup>=Turbine blower for exhaust of after storage batteries. M<sup>1</sup>=Sleeve for connection with general piping system.

A<sup>1</sup>=Exhaust, which can also be connected with M<sup>1</sup>.

After storage battery room: 101.300 cu. meters; 5 men. Pr<sup>1</sup>=Air-purifying battery.

After torpedo room: 31.700 cu. meters; 2 men. TC<sup>1</sup>=Exhaust blower of the general ventilating system.

into the after torpedo room, where the open hatch will allow its escape to the outside.

This ventilating device acts even where the water-tight door of each bulkhead is closed, that is to say, when the various ship's compartments do not communicate with each other. Naturally, however, the two branches of the ventilation circuit must be open from stem to stern.

We thus see that the general ventilation circuit has the very limited function of—

(A) *Simple circulation of air in the interior of the vessel.*—As a matter of fact *when the vessel is completely submerged* this arrangement draws air from all parts and redistributes it to all parts. The air in circulation is not fresh air but the same air, always.

Movable rubber sleeves can be fastened to some of the tube openings and carry down air into the bilges of a given locality for the renewal of lower strata of air. The definite result of this circulation will be a uniformity of the temperature, moisture, vitiation, and impoverishment of the air everywhere. Such an equal distribution of advantages and disadvantages is so rare and shining an example of hygienic socialism as to be really paradoxical. For, if it is proper that less congested areas, larger ones, those freer from chemical and biological emanations, are to be on an equality in the matter of discomforts and advantages with more favored sections, still it is certainly not logical, for example, to renew the lower stratum of air under the floor plates and put into circulation the carbonic oxid which accumulates there.

At any rate this distinct uniformity of surrounding air is as deceptive and satisfying as if something had been accomplished, and in this abnormal collection of human beings who share discomforts, vigils, and dangers it is a priceless moral comfort and perhaps a well-conceived artifice to encourage comradeship and foster a spirit of self-sacrifice.

Nor is it to be forgotten that the violent expulsion of air from the various apertures of the general circulating system produces the same deceptive sense of well-being as that imparted by electric fans, a manifest irony of sanitation which nevertheless still holds good.

We shall see further on that this closed circulation of air in the interior of a submarine acquires a real hygienic value when it comes to serve for purifying and chemically correcting vitiated air.

(B) *Devices for air renewal from the outside.*—These imply the necessity of a communication between the interior of the vessel and the atmosphere and are therefore in use only when running on the surface or during partial submergence or concealment, provided that under this latter condition communicating openings from the inside of the vessel to the outside atmosphere can project out of the water.



The *prisms of the periscopes A. A'* of the submarine (fig. 2) are the first things to emerge with their respective tubes because they are about 7 meters above the water line when the submarine is afloat. They are accompanied in their lower portions by two ventilator tubes *B. B'* (bow and stern periscope tubes) which have a free outlet to the air at a height of about three meters from the superstructure deck. These tubes, closed below by a valve, communicate with the central operating compartment.

As the vessel continues to emerge the upper plane of the conning tower rises out of the water. There can then be opened up the round hatchway *E*, the two intake openings *C. C'*, and the solitary exhaust *D*, of the combustion-motor blowers. When the craft has almost completely emerged and is afloat, the other hatchways, *P<sup>1</sup>, P<sup>3</sup>, P<sup>4</sup>*, on the superstructure deck can be opened. Besides these openings

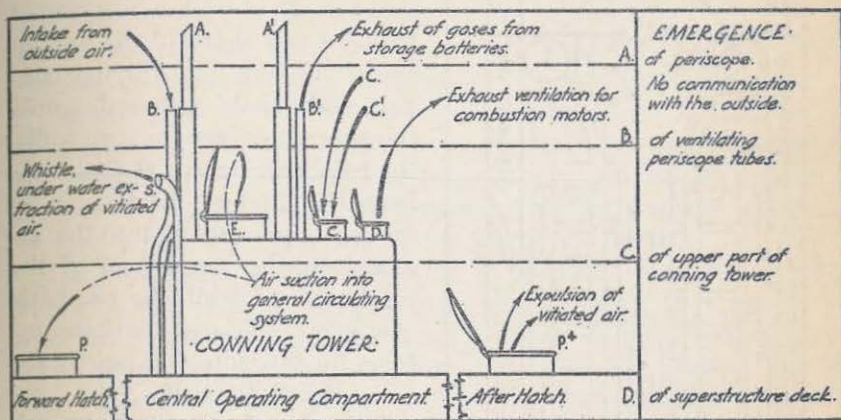


FIG. 2.—Ventilation openings of the vessel at different degrees of emergence.

there is situated on deck, aft, a large square hatch corresponding to the storage-battery room, but it is only opened in port for the purpose of taking aboard torpedoes.

We shall have nothing more to say of the mechanical ventilation of the submarine in port or during quiet cruising, when air can be drawn from without and distributed everywhere, as we have seen, through the general air-circulating system for all compartments. This system is very similar to that common to many ships.

Instead, let us examine the air renewal from the outside during partial submergence or when, owing to heavy seas, it is impossible to keep open the deck hatches. We shall then see that the ventilation is intimately connected with the operation of the submarine's propulsive mechanism.

The gasoline-combustion engines furnish the vessel's propulsion and charge the electric dynamos and storage batteries so long as the

craft is sufficiently above water to prevent air renewal from the outside. The electric motors, operated by storage batteries, replace the combustion motors in under-water cruising or during partial submergence for concealment.

**VENTILATION OF THE COMBUSTION MOTORS.**—Indirectly this bears on the hygiene of the submarine to the same extent that the ventilating devices for the motor apparatus of all ships bear on the hygiene of respirable air on board ship, though designed principally to favor combustion or the expulsion of the

results of combustion. In this particular submarine the said ventilation is intended to furnish a violent draft, for the combustion of gasoline, to 12 Diesel motors placed six on a side, amidships, connected with the two shafts of the propellers. The ventilation further conveys and expels outboard, across the space between the two hulls, the combusted gases at their exit from the cylinders. Lastly, it picks up and expels above into the atmosphere the heated air of the neighborhood, while, by two little openings in the large ventilator intakes for the motors, it renews the air of the place itself.

It is therefore a device which provides *also directly* for the renewal of respirable air and aids the other ventilating devices functioning parallel with them. It operates while the combustion motors are running, i. e., while cruising on the surface; but it operates more specifically and is effective during *partial submergence* when only the

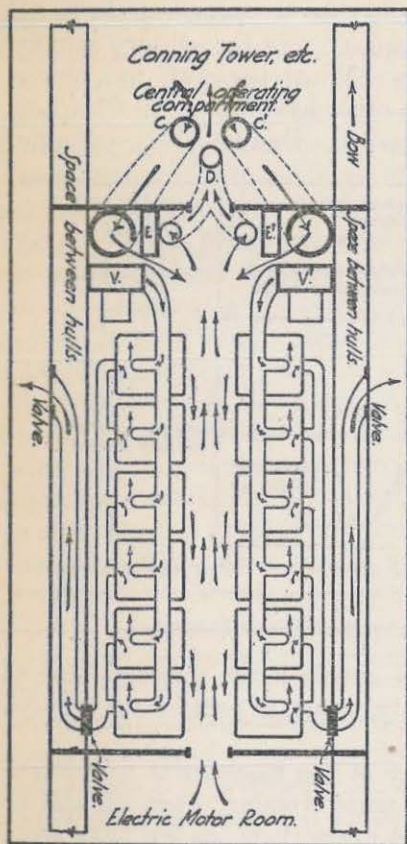


FIG. 3.—See text.

upper part of the conning tower is out of water. At this time the following protrude: Periscope tubes, conning tower, hatch, and, behind the after periscope tube, two large suction intakes *C. C'*, furnished with hatches, and farther back the exhaust opening *D* with similar closure.

In the forward part of the combustion-motor compartment (fig. 3) two powerful electric blowers *V. V'* (by means of two large pipes which, curving on themselves, enter the upper part of the space



between the two hulls and gain the conning tower) face the two suction intakes *C. C'* and from these draw in air from the outside and supply it to the motors.

Meanwhile two other small electric blowers *E. E'*, by means of two tubes which meet overhead and rise in the space between the two hulls of the conning tower, expel the air of the chamber through the outlet *D*.

The products from the gasoline combustion in the cylinders are conveyed from each of these (from both sides of the compartment) by a single large tube which opens outward above the water line on two sides of the craft after having passed along the space between hulls for four or five meters. The delivery outboard is direct when the vessel is above water. When, on the other hand, the ship is submerging, the motors stop and the last vapors from the cylinders remain and fill the delivery tube, which will, however, be cut off by two valves. As the vessel submerges the hatches which open at the top of the conning tower are closed automatically, and the closure becomes hermetic through the pressure of the water itself.

VENTILATION OF THE STORAGE BATTERIES.—(Fig. 1.) While the submarine's combustion motors are running the energy produced by the gasoline is not only used to propel the vessel but serves also to prepare the other method of propulsion during under-sea cruising, that is to say, the operation of the electric motors.

The combustion motors operating the dynamo charge the storage batteries and it is precisely during this charging that sulphurous oxid and sulphuretted hydrogen are evolved. These noxious vapors which would render the air irrespirable must be carried outside. The batteries hermetically closed by lids communicate with each other by piping which passes through the upper part of each element carrying off by a single *exhaust pipe* the gases released from them.

From the forward storage battery room and from the one aft the collecting exhaust pipe for fumes runs through the bulkhead into the central operating compartment on the right side forward, and aft into the electric-motor room on the left, respectively. In each of these two spaces the pipe connects with a powerful turbine blower which on one side sucks in the fumes and on the other expels them into a large pipe which opens immediately into the space between the hulls through a cut-off valve.

In the space between the two hulls the two pipes meet and combine to form a single duct aft of the central operating compartment. This single tube pierces the strength hull, gains the conning tower, and passing an intercepting valve empties into the after periscope tube, through which it expels the fumes from the two storage battery rooms.



Once the charging of the storage batteries is accomplished the amount of sulphurous fumes evolved by them is negligible, but it is proper nevertheless to complete the removal of them.

It may now happen that under these conditions the vessel has to submerge to escape the observation of the enemy. It will be necessary to stop the combustion motors, to stop the dynamo, and suspend the charging of the storage batteries, but it will be impossible to give up the expulsion of the last waste products if opportunity offers to remain awash for a short time. And we have seen that it is precisely when only the upper part of the conning tower projects from the water that the submarine can, through its highest connections with the atmosphere, drive out vitiated air and take in fresh air.

A glance at the diagram (fig. 1) shows that the exhaust pipe for the fumes from the storage batteries, which pipe is provided with the most powerful blowers, can be connected up with the general air-circulating system and thus proceed to a hurried but efficient ventilation of the compartments taking advantage of the partly submerged position.

The turbine *TA'* of the after storage batteries connects by a rubber sleeve *M'* with the left outlet of the general ventilating circuit. It will then extract air from all the surrounding parts by the left-hand openings of the ventilation circuit, will convey this air through the exhaust pipe for the gases from the storage batteries, and will drive it through the after periscope tube.

At the same time if we connect the exhaust pipe at the turbine *TA* of the forward storage batteries by means of a rubber sleeve to the bow periscope tube, if we close the valve of the tube which would lead to the after periscope, and if we connect instead at *K* the current of the turbine to the general ventilating circuit, the external air will be sucked in by the forward periscope tube and driven to all parts of the vessel.

While the turbines of the storage batteries are performing this special function to serve for general ventilation the blower in the forward torpedo room must be inactive, while that of the corresponding locality aft can be in motion, aiding the withdrawal of air from neighboring spaces.

The two valves at the ends of the air-circulating system must keep the tube closed so that, as we have seen elsewhere, one half this system can be used as exhaust and the other half force air into compartments.

Complete submersion of the vessel causes sea water to fill the two ventilation tubes which accompany the periscopes (tubes of the periscopes).



If the submarine, rising after a long submergence, should desire to remain awash and proceed to the ventilation of compartments with the device just described, it would first have to discharge the salt water from the periscope tubes. It has already been stated that these have a valve in their lower portions. Above this a small caliber branch of the compressed-air circuit enters the periscope tube and the compressed air rushing forcibly into the tube will drive out the water.

VENTILATION OF ELECTRIC MOTORS.—(Figs. 1 and 4.) The electric motors are the means of propulsion when cruising wholly submerged; that is to say, when interchange of air between inside and outside is impossible. However, under certain circumstances, the submarine using the electric motors cruises half submerged or at least with the periscope tubes out of water, in the position of concealment.

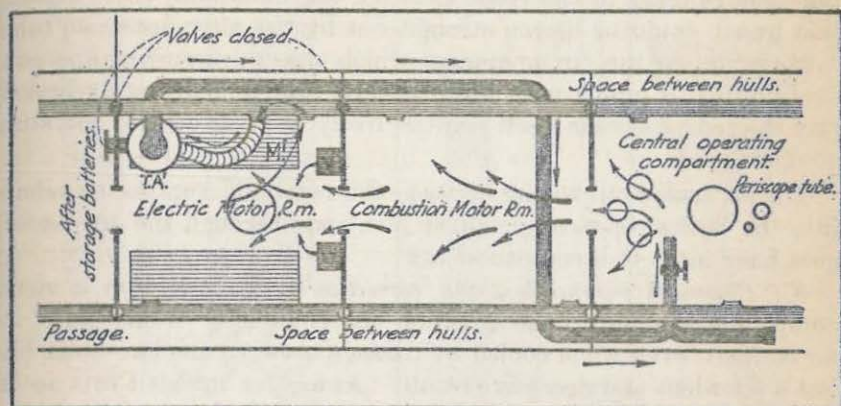


Fig. 4.—Diagram of the ventilation of electric motors.

The electric-motor room is the one which heats up the most during under-water cruising and yet this strongly heated air can not be driven out and replaced when cruising. What can be done is to put this air into circulation by means of the general air-circulating system, thoroughly distributing the heat, and equalizing the temperature of all compartments.

In the meanwhile two special electric blowers, *V. V'*, placed forward of the motors, actively circulate the air through the intakes acting as exhausts. At the same time both forward and aft (torpedo rooms) the blowers of the principal circuit are at work for the circulation of air everywhere.

Besides this mechanism of partial ventilation, which does indeed procure a relative relief for the crew, it is possible in the electric-motor rooms to obtain another kind of air circulation of greater efficiency as regards reducing the elevated temperature of this space without pour-



ing a part of the heat into other sections. We mean by aspirating the very hot air flowing through the intakes and making it pass through the piping which runs between the two hulls (where the sea water circulates freely), so that in its passage it is cooled.

In the same locality as the electric motors there is on the left, aft, the large turbine blower which ordinarily serves to extract the vapors from the storage batteries. This is disconnected from them and connected up instead with the principal ventilation circuit by means of a large rubber sleeve *M'* intended for this purpose. In this way the blower can exhaust air from its immediate surroundings. The general ventilation circuit is intercepted forward and aft of this space at the water-tight bulkheads.

The air sucked in by the turbine (after having been set in motion by the extractors of hot air of the intakes) will be driven through the big tube running in the space between the hulls and when cruising just awash could be driven straight out by the after periscope tube.

However, in the circumstances which we are discussing the connection of this piping with the periscope tube is deliberately broken and the piping system itself empties freely into the central operating compartment.

The air cooled on passing between the two hulls empties, therefore, into the central operating compartment and through the open doors goes back into other compartments.

(C) *Chemical purification and correction of the air.*—On a vessel completely submerged the agitation and equalizing circulation of its air content, even when cooled by passage between the two hulls, has but a transient and deceptive result. At a given moment it is necessary to renew the air rendered irrespirable and if special reasons render it expedient to economize in the renewal, it is essential to be able to estimate when the renewal is about to become indispensable.

To wait until the discomfort of the crew becomes manifest, or to judge of the general insufficiency of the air by the proof of a match refusing to burn, or by the uneasiness of an unfortunate little mouse kept prisoner in a cage for this express purpose, these are guides too fallacious and empirical to be relied on.

It is more scientific to measure the fouling of the air, and, being unable, by practical measures, to estimate the quantity of the organic and inorganic poisons that vitiate confined air, one must be satisfied to measure the per cent of carbonic oxid.

On the submarine which we are studying the firm of Draeger, of Lübeck, recommends the use of an apparatus of its own which serves also to estimate the residual oxygen in addition to that contributing to the CO<sub>2</sub> outpoured into the confined air. The apparatus has the advantage of being transportable, light, of occupying little space, and of being comparatively simple to work.



It is based on the principle of measuring a given volume of air and the difference observed after a chemical substance brought into intimate contact with it has absorbed the gas to be measured. (Fig. 5.)

*F* is a graduated cylinder to be first filled with water by raising the container *H*, with which it communicates through its bottom.

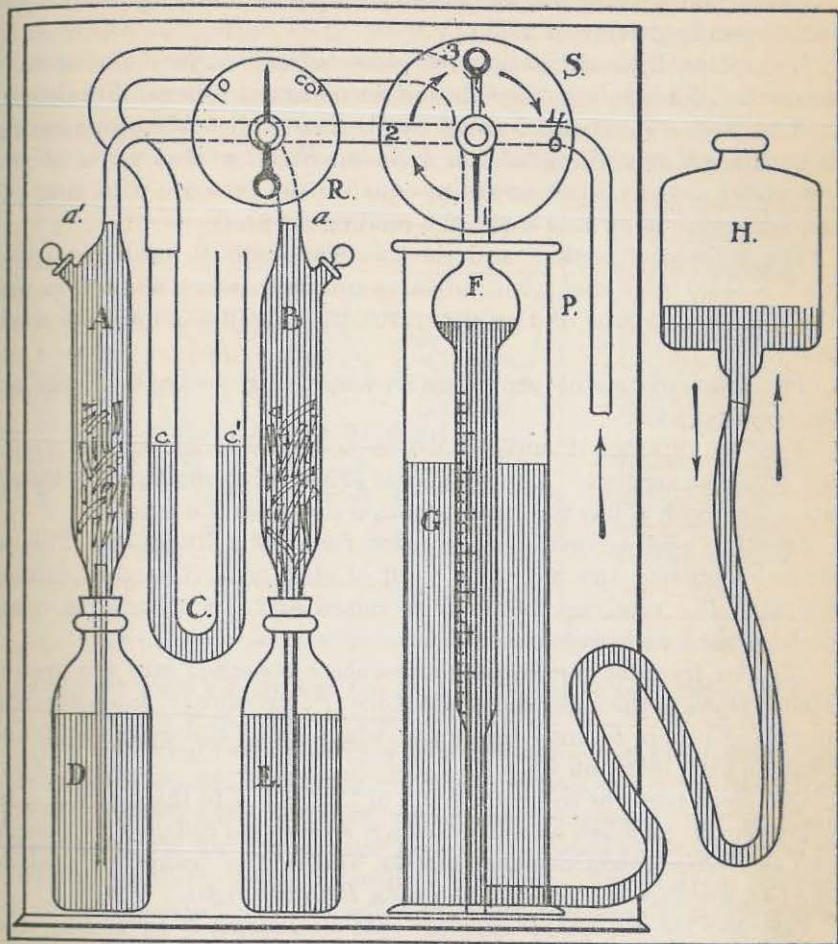


FIG. 5.—Draeger apparatus for testing purity of air.

By an opposite movement it is emptied of water and filled with air from the surroundings through the tube *P*. The cylinder *F* dips into a cooling bath *G*. *D* and *E* are bottles full of reagents and surmounted by the pipettes *A* and *B*. The liquid *D* serves to fix the oxygen which is made to bubble through it.

The fluid reagent is composed of a saturated solution, in the cold, of ammonium carbonate, with an equal volume of sal ammoniac

having a specific gravity of 0.830. The solution is colorless, but turns blue after contact with oxygen, which, in the pipette *A*, fastens on the little spools of copper gauze placed there also to increase the area of contact with the gas as it bubbles up.

The liquid *E* serves to fix the  $\text{CO}_2$  of the air, which is made to bubble there. The fluid reagent is composed of an aqueous solution of potassium hydrate, approximately 33 per cent strength and having a specific gravity of 1.325.

In pipette *B* small sections of glass tubing increase the area of contact. When in use, the solution becomes red (phenolphthalein?).

A hydrostatic balance formed by the bent tube *C* communicating with the air over the graduate cylinder *F* (after absorption of the gas under examination) serves to equalize the pressure with that of the surrounding air and make the reading accurate.

The three-way cock *S* and the two-way cock *R*, each furnished with a hand on a dial with indicator numbers, serve in turn to put the various portions of the apparatus in communication with each other.

The following is the procedure in examining a sample of the air on board:

The two pipettes *A* and *B* must be accurately filled to the marks *aa'* with the reagent. The cock *R* is closed with the hand pointing up. The cock *S* has the hand pointing down on the mark 1.

(1) *Air must be completely expelled from the cylinder F.* This is done by putting the indicator hand of stop cock *S* at zero (under the 4). The receiving pump *H* is raised and the cylinder is completely filled with water.

(2) *Air from the surrounding atmosphere* is sucked into the graduated cylinder through the little tube *P* by simply lowering the receiving pump *H* until the water which filled the cylinder *F* has sunk to zero mark on its scale.

(3) Next turn the indicator hand of the cock *S* to the figure 2. In other words, *establish a communication between the collected air sample and the bottles containing the reagents*, and if it is desired to analyze the  $\text{CO}_2$  displace the hand of the cock *R* to the right.

(4) *Mix the air sample collected with the reagent B* by raising and lowering the pump *H* several times. Finally it is lowered and thus the air refills the graduated cylinder until the fluid reagent returns in the pipette *B* to the mark *a*. Turn the hand on cock *R* back to vertical in center (closed).

(5) *Establish communication between the collected air sample and the hydrostatic balance C* by turning the hand of the cock *S* to the figure 3.

The U-tube is leveled; that is to say, the pressure of the air sample collected is reduced to the same pressure as that of the surrounding



atmosphere by lowering and raising slightly the receiving pump *H* until the fluid in the two arms of the barometric tube (hydrostatic balance) *C* is at the same level.

(6) Take the reading of the graduated cylinder where the fluid will have risen to the figure which indicates (on the right of the tube) how much  $\text{CO}_2$  existed in the air tested.

**CHEMICAL PURIFICATION OF THE VITIATED AIR.**—This consists, on board this submarine, in the absorption of the moisture and the carbonic oxid. The difference between this and analogous methods lies essentially in the special construction of the absorbing bottles and their assemblage in a sort of filtration battery connected with the general ventilating system in such a manner that in these batteries

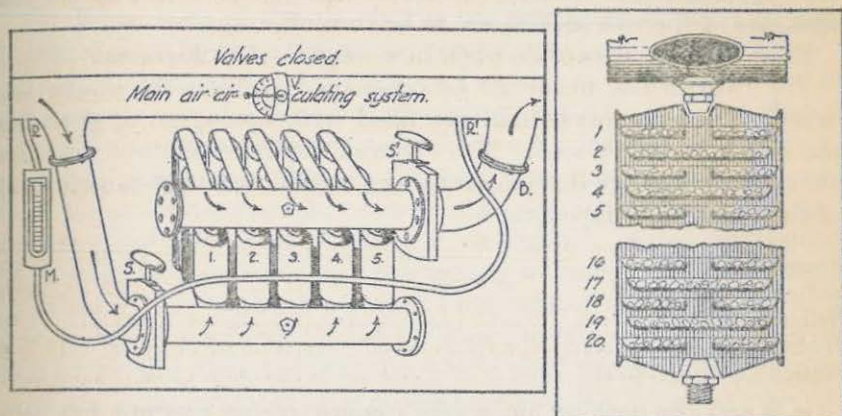


FIG. 6.—Diagram of an air-purifying battery and of a single element Draeger apparatus.

all the air from all parts of the ship is obliged to pass through it and to unload the aqueous vapor and the  $\text{CO}_2$ .

The purifying batteries (fig. 6) bear the same manufacturer's name as does the apparatus for the chemical analysis of air just described. There are two such batteries, each placed outboard, in one of the compartments for the storage batteries, connected, as shown in the diagram, with the general ventilation circuit. Two valves, however, *S S'*, can isolate them, but when they are operating it is the general ventilation circuit which is cut off by the valve *V*, and then the two valves *S S'* being open the air is compelled to circulate through the purifying batteries.

If the two blowers at the extreme ends of the general circuit are working, the two batteries operate in combination with them; but if a portion of the general ventilation circuit is cut off they act independently.

It is clearly seen from the diagram that two leads of the general ventilation circuit form two horizontal arms closed at the ends and

placed at a certain distance one above the other. From the two arms there start, parallel and corresponding above and below, five tubular branches having an elliptical cross section. In each of the five upper arms are located nipples, and an equal number are to be found in the five lower arms.

The elements of the battery, 20 in number, otherwise known as "capsules," are brass cylinders 21 cm. long and 9.5 cm. wide. The two extremities are projecting cones perforated in the center so as to fit on the nipples of the arms of the battery. The coaptation is simple and quick because the upper nipple has a spiral spring which, being pushed on by the capsule itself, retreats a little so as to permit fitting the capsule into the lower nipple. Before setting up each of the capsules of the battery two little metal strips which sealed the openings of the two sockets are to be torn off.

Each element or capsule when new weighs 1.15 kilograms.

The capsule has inside 20 saucer-shaped shelves, one above the other. These concave disks are filled with homogeneous granules the size of a millet seed. The chemical analysis of these granules shows that they are deliquescent, very soluble, strongly caustic, and of the following composition:

	Per cent.
Potassium hydrate.....	19.31
Sodium hydrate.....	66.21
Sulphuric acid.....	1.30
Hydrochloric acid.....	.66
Water.....	12.52

It is actually nothing but a very impure sodium hydrate, but conveniently put up in granular form. Each disk full of granules is covered by a metallic netting.

The disks are superimposed in such a way that for each one that fits exactly in the capsule and is perforated in the center there is another whole one placed over it not perforated but of less diameter, so that a space is left between its periphery and the sides of the capsule. By this arrangement air coming from below passes successively from the center and from the periphery of each individual disk, and thus is compelled to come in contact with all the granules of caustic alkalis to neutralize its carbonic oxid.

It is estimated that each battery of 20 elements can neutralize all the  $\text{CO}_2$  emitted by about 40 persons in 8 to 10 hours. There is carried on board a reserve supply of 200 capsules to permit replacement of the elements used up in the purifying batteries.

It is useful to be able to tell when the battery capsules are to be regarded as exhausted. They are exhausted:

(1) When the elements do not heat up on the passage through them of air, or when they grow warm and immediately cool off, or when the outlet pipes stay cold.



(2) When there is too great increase of resistance to the passage of air through the batteries because the granules, swollen and sticky from moisture, have clogged the metal nettings. If under these conditions the capsule is shaken, one no longer hears the noise which the dry granules of caustic alkali make in a new capsule. To judge of the resistance to the passage of air (fig. 6), a manometer, *M*, with liquid columns, is connected with the section of ventilating pipe ahead (*R*) leading to the battery and with that section after it and leading away from it (*R'*). In the latter there will be a depression due to the greatly increased resistance of the worn-out elements.

(3) When the capsules have increased 250 gm. in weight due to the aqueous vapor they have absorbed.

(4) When tests of the air after it has circulated in the purifying batteries show no reduction in the percentage of carbon dioxide.

In every compartment of the vessel which can be isolated a few of the Draeger capsules described above are kept with the idea that if some special casualty were to confine several persons to that compartment and completely shut them off from immediate succor and from the other resources for renewal of respirable air, they could take advantage of *individual filtration of vitiated air*. After the fashion of an explorer who can drink the muddy water of a ditch or marsh by sucking it up through a pocket filter, one of the crew could as a *last resort*, while waiting for help to come, breathe the air laden with  $\text{CO}_2$  by holding close to his mouth one of the Draeger purifying capsules and using a rubber tube connection with it.

Coincidentally with the purification of vitiated air by the absorption of moisture and  $\text{CO}_2$  there is the lesser necessity of restoring to the air on board the oxygen consumed. On board this submarine instead of the local production of oxygen the storage of this gas, ready for use in every contingency, is preferred.

*Storage distribution of oxygen on board.*—In each of the seven principal compartments of the vessel where the personnel is distributed there is safely secured to the overhead frames a steel tank having a capacity of 8 liters containing oxygen for breathing. As the crew consists of 36 persons, each individual has available 226 liters of oxygen, which, considering the requirements of an adult of average weight, represents an individual oxygen reserve for breathing for seven to eight hours in the absence of any other resource (*sic*).

A small metal tube leading from the tank reaches a common pipe (of about 6 mm. diameter) and from this is led off close at hand the pipe discharging into the compartment passing through a first pressure gauge which measures the quantity of oxygen remaining in the tank and then through a wash bottle (purifier) and finally through a second gauge to regulate the rate of flow.

The oxygen tanks are all connected up one with another by a common pipe, which runs through all the compartments on the left, having a cut-off valve at each water-tight bulkhead. It is thus possible, for example, for the oxygen of all the tanks or of those which are still charged to pass from the bow to some extreme aft section, or at any rate to be used by the crew, if imprisoned, taking refuge in a given compartment.

In some German submarines the oxygen circulation system has an outboard lead which permits all the tanks to be partially recharged without taking them down.

NOTE REGARDING THE LOCATION OF PURIFYING BATTERIES ON BOARD.—We have said that the two air-purifying batteries are placed respectively in the accumulator rooms forward and aft. It may happen (and such an occurrence has already been recorded) that dur-

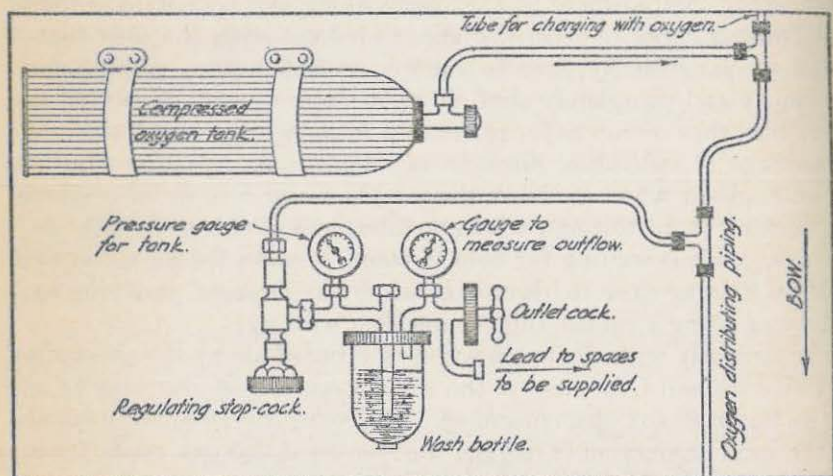


FIG. 7.—See text.

ing the operation of removing gaseous products from the storage batteries, in the event of casualty to the blower or damage to the piping there might, for a moment, be an entrance into said piping of a little sea water and hence its aspiration into the chests containing the storage batteries. Sea water in contact with  $H_2SO_4$  will cause free evolution of chlorine gas and with the production of such pressure as to force off the covers and invade the compartments, which would then have to be evacuated at once by the personnel and shut off by the closing of water-tight doors.

It is to provide against just such a contingency that there has been established on board a route of communication (fore and aft passage between the two hulls) between forward and aft compartments in case the storage-battery chambers were cut off.



Under these circumstances how would the air-purifying batteries be employed if there should ensue a need for them? It is clear that these purifying batteries have an ill-chosen location, which should be altered.

**SUPPLY OF COMPRESSED AIR.**—This is proportioned to the tonnage of the vessel, but not so much with reference to the needs of the craft, which can never be foreseen with accuracy, as with reference to the weight and space available inside the strength hull in the midst of its intricate confusion of pipes and apparatus.

On the *Balilla*, wherever room can be found, there are installed steel tanks containing air compressed to a pressure of 175 atmospheres. There are, in all, 227 of these, with a total capacity of 9,000 liters, containing about 2 tons weight of air. They represent the available power for driving the water out of the double bottoms, and by their energy alone would enable the vessel to come to the surface five times in succession from a state of complete submersion.

It is to be remarked, however, that the emptying of the double bottoms before resorting to this precious reserve of latent energy is accomplished by the use of the electric motors, and, as a matter of fact, there are on board two turbines which function regularly for *water removal* and can pump out 100 tons an hour from the double bottoms. This potential energy of compressed air must be absolutely available and kept up to requirements at all times, and, naturally, it is necessary to replace what compressed air is gradually used up. With this in view, there are *two air compressors* which operate when the vessel is in free communication with the outside atmosphere.

**Compressed-air circuit.**—All the compressed-air tanks are connected together in groups and are united by a special system of small cross-section piping, which leads into the double bottoms, and is controlled by special valves, in a row, in the central operating compartment marked so as to show plainly the group they control.

**Renewal of respirable air from the compressed-air supply.**—A small group of compressed-air tanks is always in communication with all parts of the ship by a special small-caliber piping, that runs along the left side only of the ship and that in each compartment has a branch with an outlet valve. This group of tanks can be connected with other groups, still charged, should the former be exhausted, and this is shown by the indicators of the respective pressure gauges in the central operating compartment.

If the submarine were stationary on the bottom, the resources of the compressed-air supply alone would insure the respiration of 40 people for two whole days.

But the inflow of compressed air to the compartments to renew respirable air must be accompanied by:



*Removal of vitiated air.*—Vitiated air, in the special conditions under consideration can be removed by two distinct measures:

(1) It can be aspirated from the compartments, borne to the compressors, which raise it to a pressure above that prevailing outside the vessel motionless on the bottom, and finally driven out by the tube for the whistle through the mass of surrounding water.

(2) It may be compressed by the above devices and then driven into those groups of tanks which have already been emptied. These are usually the groups which served to vaporize the gasoline of the combustion motors.

The barometer readings indicate the lowering of pressure in the vessel's compartments during aspiration and removal of vitiated air. At intervals more air is admitted from the tanks, and the operation is repeated as often as it is judged that the air is insufficiently renewed.

RESCUE VENTILATION FROM WITHOUT.—To be more exact, we should speak of entrance of rescue air from the outside into a submarine fast on the bottom, when casualties to the double-bottom exhaust pumps or the absence or reduction of available compressed air makes it impossible for the vessel to come to the surface. If, happily, this serious accident is made known to the outside world, prompt succor is indicated, since it is not easy to ascertain how much respirable air is still available to the victims within. Rescue work has two objects in view—to bring the vessel to the surface and, simultaneously, to furnish the victims with fresh air.

A diver, tended by a second boat with another pressure pump, goes to the bottom, locates the submarine, and proceeds to the inspection of the superstructure deck.

Distributed forward, amidships, and aft on the superstructure deck are six plugs for the attachment of the rubber hose from the diving pump. The diver will easily recognize one of these by the sense of touch. Two of these, for example (aft), are covered by a hinged grating recognizable by a large and projecting metal cross which runs over it. Furthermore, near the grating, there is a stout bronze grab rail that the diver can hold on by. On the other hand, the forward plugs are on the forward surface of the conning tower and can be recognized by touch as there is a wrench for opening them close at hand.

At any rate, having recognized one of these plugs for attachment, the diver will fasten to it the coupling of a rubber hose, lowered to him from above, while, from its own proper pump, the people in the boat will force air violently through it to eject the water which it may contain. Once the hose is connected up the diver opens the valve in the plug and air can be pumped into the interior with the appropriate pressure.



The attachment plugs for the diver's hose are joined inside the submarine to a special *air-rescue piping* which leads to the double bottoms for raising or submerging the vessel, and furthermore traverses all compartments as a circular conduit parallel to the main general ventilation circuit presenting inlet openings in each locality. This conduit has a cross section of about 25 mm.

The wrecked victims within are thus able to get fresh air to breathe, while the introduction of air into the double bottoms raises the vessel to the surface.

#### A COMPLEMENT-FIXATION TEST FOR SYPHILIS USING HUMAN COMPLEMENT.

By SARA B. MYER, Chief Nurse, United States Navy.

As Butler and Landon remark, "It is without doubt an advantage in the Navy to be able to do reliable tests for syphilis using other complement than that of the guinea-pig."<sup>1</sup>

The following test has been developed in the hope that it may prove generally useful by reason of the simplicity of the technic, the elimination of animals for complement and red blood cells, and the ease of interpretation. The reagents can be easily obtained and preserved.

In using the test in a long series of cases, nothing has developed to discredit the value of human complement, and, indeed, it has been observed that the anticomplementary action of different human sera is less marked when using human complement than when using guinea-pig complement, thereby requiring a smaller margin for anticomplementary absorption, and allowing the test to be made more delicate.

It has been found that the absolute unit of amboceptor—"the least amount that will give complete hemolysis under any circumstances"<sup>2</sup>—may be ascertained with greater precision when using human complement, than when using guinea-pig complement.

Each patient's blood is drawn from a vein with a 2-mil syringe and medium-sized needle, and put into a centrifuge tube with his name and number. After standing 15 minutes, the blood is centrifuged to separate the serum, and inactivated by heating at 56 C. for 20 minutes in an incubator. A known negative and a known strongly positive serum are always included in the series.

Tubes for the test are 6 mm. (inside diameter) by 6 cm., and are set up in racks in pairs, each pair being numbered, one pair for each

<sup>1</sup> Butler, C. S., and Landon, W. F. A Technic for the Absorption Test for Syphilis Using Human Complement. NAVAL MEDICAL BULLETIN, x, No. 1, January, 1916.

<sup>2</sup> Noguchi, H. Serum Diagnosis of Syphilis.

patient. The front row contains antigen and is the test, while the back row is the control without antigen.

A capillary pipette is graduated to 0.05, 0.1, 0.25, and 1 mil.

The amounts used in the test are as follows:

	Mil.
Antigen dilution.....	0.25
Complement dilution.....	.05
Patient's serum.....	.10
Sensitized red cells (composed of amboceptor solution).....	0.05
5 per cent red cell suspension.....	.05
	<hr/>
	.10
Total volume.....	.50

The salt solution used is 0.9 per cent aqueous sodium chlorid.

The technic for the test is very simple. Having made up the red cell suspension and the amboceptor paper solution, titrate the complement as directed below, and choose the dilution to be used in the test. Now proceed with the actual test. Mix equal parts of the amboceptor solution and red cell suspension, and place in the incubator to sensitize for 30 minutes, shaking frequently, as the cells tend to agglutinate.

Now set up a pair of tubes for each serum to be tested with 0.1 mil of serum in each tube, washing pipette thoroughly after each pair. Add 0.05 mil of the chosen dilution of complement to each tube, and 0.25 mil of salt solution to each tube in back row, and 0.25 mil of antigen dilution to each in the front row. Shake well and incubate for 25 minutes. Then add 0.1 mil of the sensitized red cell suspension to each tube, shake, incubate for 15 minutes, shake again, and allow to settle for 30 minutes. Read in the usual manner.

The red cell suspension is prepared in the following manner. Two graduated centrifuge tubes are filled to 10 mils with 1 per cent sodium citrate in salt solution. (Two tubes are prepared as one may be broken.) As each patient's blood is drawn, a few drops are added to the solution in the tubes—about 1.5 mils in all. The red cells are thrown down in the centrifuge, washed five times with salt solution, and then made up to 5 per cent in same. The red cells are sensitized for the test and also for the titrations by mixing equal parts of this suspension with the amboceptor solution, and incubated at 37 C. for exactly 30 minutes.

The amboceptor solution is prepared by extracting 5 Noguchi units of antihuman amboceptor paper in 1 mil of salt solution at room temperature for exactly 30 minutes and then filtering. Enough of this solution must be prepared to allow 0.05 mil for each tube in the series and titrations, and at least 1.5 mils for waste. The filter paper takes up about 1 mil. To titrate, different amounts of this solution are mixed with 0.05 mil of 5 per cent red cell suspension, each tube being made up to 0.45 mil with salt solution, and incubated



for 30 minutes to sensitize. The titration is completed by adding 0.05 mil 100 per cent human complement (fresh serum) to each tube, and incubating for 15 minutes. It has been found that 0.05 mil is usually equivalent to 1.5 units. This unit is practically constant, and this titration need not be done before each series.

The complement is titrated before each series. To do this, six tubes are set up, each containing 0.35 mil salt solution, 0.05 mil amboceptor solution (1.5 units), and 0.05 mil 5 per cent red cell suspension. These are then incubated for 30 minutes to sensitize, shaking three times during the incubation. While waiting for this, six dilutions of human complement from known negative cases (mixed sera, if possible) are made up in small amounts—75 per cent, 66 $\frac{2}{3}$  per cent, 50 per cent, 40 per cent, 33 $\frac{1}{3}$  per cent, 25 per cent. When sensitized, each of the above tubes has added to it 0.05 mil of one of these dilutions. They are then shaken, and incubated for 15 minutes. The tube containing the least amount of complement which shows complete hemolysis is noted, and this amount of complement plus about 15 per cent is the amount used in the test. For instance, if 50 per cent gives complete hemolysis, then 66 $\frac{2}{3}$  per cent is used in the test.

The acetone-insoluble antigen obtained from the United States Naval Medical School is titrated with this hemolytic system, and used in a strength equal to one-fifth of its least anticomplementary dose—usually 0.25 mil of a 1 to 100 dilution—providing this is equal to at least 5 antigenic units as titrated with a strongly positive serum.

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#### THE ADVISABILITY OF A MORE GENERAL USE OF THE WASSERMANN TEST IN THE SERVICE.

By G. F. CLARK, Passed Assistant Surgeon, United States Navy.

In a private communication, one of the foremost young neurologists of the United States has called attention to the case of a patient, which may prove of interest to the service. The physician in question has the interest of the service at heart, as was shown by his joining in the cruise of the civilian volunteers during the past summer's maneuvers.

The history of the case is briefly as follows: Age, 33; married and the father of a healthy boy of 26 months; served one enlistment in an arm of the United States service. While on foreign duty he had been continent, because of the possibility of infection, of which he had been warned by medical officers. On his return to the United States, he had become intoxicated and was exposed to infection, this having been some years before being seen by the physician reporting the case. The medical officers of the service disagreed as to the nature of the lesion which followed exposure, but the con-



clusion finally reached was that it was a harmless abrasion. No manifestations developed and no treatment was received, although the patient had requested treatment if needed. At that time the Wassermann reaction was not in common use. The patient felt that he was well. He married a woman of high character and had told her, prior to marriage, that he had never had venereal disease—as he had come honestly to believe. He entered business and was successful in a modest way. One year ago it was noticed that he began to have exaggerated ideas, and defects of memory and speech. While he had previously been able to save money, he then became reckless and wasted his savings. On coming under observation of the neurologist, Wassermann tests of blood serum and cerebrospinal fluid were found positive, with pleocytosis of spinal fluid, mental and neurological findings. Diagnosis rests between paresis and cerebral gumma.

No blame can be attributed to the medical officers of the service in which the man served, because at the time they had to depend on clinical observations alone, and no manifestations other than the sore were observed. There is a distinct lesson to be drawn for the present and future. It is not believed that more men of the service in proportion to the number of infections, go untreated, partially treated, or unrecognized, than in civil life; but in view of the large number of cases of syphilis—the diagnosis of which has first been suggested by a positive Wassermann test—it is believed that every case coming to a United States naval hospital should have a Wassermann test, regardless of the condition for which the patient is admitted. Many of the best institutions are having such tests made as a routine measure.

The next logical measure would be to have Wassermann tests made for all recruits before they are sent into general service, for all men reenlisting, and for all who are candidates for original appointment as commissioned officers prior to their final acceptance. While there might appear some objections to such a measure, the advantages derived would far outweigh them, when full consideration is given to the disability, loss of time, and expense to the Government due to syphilis and its sequelae.

All authorities are in agreement as to the great value of properly performed Wassermann tests. It is also recognized that the test alone—especially where the reaction is positive to only a slight degree—should not be used as a sole means of diagnosis. The history and a careful clinical examination are of the utmost importance.

Some members of the Hospital Corps have become very proficient in carrying out Wassermann tests, but there are so many sources of error that it is believed that the medical officer having charge of



laboratory work should give sufficient time to check up their work. It is only by taking an active, personal interest, that the best results are obtainable. Frequently the members of the Hospital Corps may not have opportunities to study the current literature, or may not fully understand the technical terms.

Many years before the Wassermann test was available or there was any knowledge concerning the causative agent of syphilis, it was recognized that it was impossible to determine, clinically, whether a sore was a chancre or chancroid.

In the service, patients can be kept under observation for a period of two or three months after the appearance of the sore. If, at the end of that time, no manifestations have been observed and the Wassermann tests are persistently negative, one can feel reasonably safe in making a diagnosis of chancroid. The dark field illuminator, which is far superior to India ink in the diagnosis of the initial lesion, is only to be used with the greatest caution, if at all, in making a diagnosis. In a few selected cases, with a typically indurated sore and a history of exposure at a time sufficient to give the usual period of incubation, one may, by careful work with the dark field illuminator and the Wassermann test, reach a diagnosis before the appearance of secondary symptoms. Most careful consideration should always be given to each case before a diagnosis of syphilis is made, not only because of the influence such a diagnosis may have upon the life of the individual but from a material standpoint. Once such a diagnosis is made, it will persistently follow a man in the service, often to his detriment in assignment to duty, etc., or after he has left the service it may possibly act as a bar to pension or retirement in an otherwise deserving case.

The following recommendations are made:

(1) Wassermann tests for all patients admitted to a United States naval hospital.

(2) Wassermann tests for all recruits before they are sent into general service; for every man who reenlists; for all candidates for original appointment as commissioned officers.

(3) A period of observation with Wassermann tests for every man having a genital sore, no matter how insignificant.

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#### WRIGHT'S SOLUTION IN CONJUNCTION WITH ARGYROL IN TREATMENT OF GONORRHEA.

By C. H. DRAGOO, Passed Assistant Surgeon, United States Navy.

The use of hypertonic salt solution in infected wounds has been very extensive during the past two years and much has been written about its value and usefulness.

Wright's solution has been used extensively, but it seems to have been principally confined to the treatment of infected gunshot wounds.

Recently I combined irrigations of Wright's solution with injections of argyrol (10 per cent) in acute gonococcic infections of the urethra, and although my cases have been few I feel that the results are worth recording.

I attempted to obtain strictly fresh, positive cases of gonorrhea, which had received no previous treatment. These were kept in the hospital under restriction and no regulation of diet or other treatment given except rest in bed for three days in the beginning of the disease. Pus smears were made every morning and Gram's stain was used throughout.

*Case No. 1.*—Received in the hospital on the second day of the disease. There was a profuse mucopurulent discharge containing numerous intra and extra cellular Gram-negative cocci. Patient was placed in bed for the first three days. Irrigations of Wright's solution for 1½ hours a. m. and 1½ hours p. m. were administered, followed each time in 1 hour by an injection of argyrol (10 per cent) which was retained for 5 minutes.

Second day, no change, smear positive for gonococci.

Third day, no change, smear positive for gonococci.

Fourth day, fewer gonococci, smear positive.

Fifth day, no gonococci found in two slides this date.

Sixth day, no gonococci, discharge lessened.

Treatment was continued until the tenth day. Slight discharge continued for about two weeks after treatment was discontinued, and smears were examined every day, but all were negative. This man was sent to duty as cured.

*Case No. 2.*—There was some doubt about this case being a purely recent infection, but the discharge was purulent and gonococci intracellular.

The same routine was carried out here as in the first case. Smears were positive until the 12th day, when they became negative and remained so for two weeks thereafter, when the man was discharged to duty as cured. Treatment discontinued on the 20th day.

*Case No. 3.*—A fresh case which developed while the patient was convalescing in the hospital from pleurisy. There was a purulent discharge, containing numerous gonococci. Routine treatment as above. No signs of improvement for 18 days, when smear was negative, but did not remain so, although there was marked improvement. On the 25th day this man was sent to his ship as not cured but fit for duty. This patient failed in many ways to cooperate with the medical officer in the treatment of his disease.

The many small glands which line the urethra act as a trap for the germs in gonorrhea and make local treatment very unsatisfactory. The osmosis resulting from the irrigations would seem to flush out these glands and mechanically remove the gonococci,



while the injections of argyrol would serve as a germicide for any remaining cocci which had resisted the flushing process.

The irrigations were given, with the patient sitting on a chair, with a soft rubber catheter which had been perforated in many places for about  $2\frac{1}{2}$  inches of its length. This was inserted into the urethra and attached to an irrigator, with the solution flowing about as in the Murphy drip method of proctocolysis.

There was no pain connected with this treatment.

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#### THE INTRAVASCULAR INJECTION OF OXYGEN.<sup>1</sup>

By J. J. A. McMULLIN, Passed Assistant Surgeon, United States Navy.

Several years ago, while reading Brubaker's Textbook of Physiology, I was impressed with the statement that arterial blood, under normal conditions, is not saturated with oxygen. The idea occurred to me that it might be possible to saturate completely the blood with oxygen by direct injection of the gas into the circulating blood. Some time later I was again impressed with this idea when the *Journal of the American Medical Association* (lxii, No. 19, May 9, 1914) commented editorially on the subject of oxygen saturation of arterial blood as follows:

Certain statistics with respect to the normal functions of the human body are transmitted from one generation of students to the next with little concern for their subsequent verification. This is true of some of the data relating to the blood of man. Now and then chance furnishes some new item to corroborate an old one in a way that increases respect for the permanence of scientific knowledge. We are taught, for example, that the blood is practically saturated with oxygen as it passes the lungs under ordinary conditions of circulation and respiration. An expert in blood-gas analysis was recently afforded an opportunity to verify this by collecting some arterial blood, uncontaminated either with air or anesthetics, for analysis during the process of a transfusion. The blood proved to be 94 per cent saturated with oxygen.

The idea of oxygen injection was brought to the attention of Surgeon C. H. Gardner, of the Public Health Service, who invited me to try the experiment in the Buffalo Public Health Service Hospital. I am therefore indebted to Dr. Gardner for the opportunity to perform the experiments about to be described.

In the first experiment a rabbit was used. Oxygen was slowly injected for several minutes into each femoral artery. The abdomen was then opened, and the gas was introduced into the abdominal aorta. When the needle was withdrawn from the aorta there was some hemorrhage, so the aorta was ligated and the animal was allowed to die under the anesthetic.

An artery was selected instead of a vein in order that the gas might be more rapidly carried away from the site of injection, and also for the reason that there might be an opportunity for any uncombined gas to be absorbed by the perivascular lymph in passing

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<sup>1</sup> Received for publication Sept. 13, 1915.



through the capillaries; any remaining free oxygen would have an opportunity to combine with the venous blood returning to the heart.

In the second experiment a dog was used. The animal was etherized and the right femoral artery was exposed. Oxygen was slowly introduced into the artery for five minutes. During the administration of the oxygen the animal's air passages were closed, whereupon he soon made violent respiratory efforts. It was thought that the oxygen injection might obviate the necessity of breathing through the lungs, and that there might be no demand for pulmonary oxygenation. The increased respiratory efforts prove that this is not so; the increased respiration was probably caused by an accumulation of carbon dioxid in the blood stimulating the respiratory center, and not by a lack of oxygen in the tissues of the blood. The experiment was concluded by ligating the artery and closing the incision.

The third experiment was performed on the same dog three days later. The abdomen was opened; a needle was introduced into the abdominal aorta, and oxygen injected slowly. The blood pressure in the aorta was greater than the oxygen pressure, made evident by the fact that blood was forced back into the water bottle connected with the oxygen tank. The supply of oxygen was increased until this difficulty was overcome, and the injection was continued for five minutes. During the injection the mesenteric vessels became greatly engorged, and even the smallest branches stood out prominently and pulsated violently. The animal seemed to be in no imminent danger of death, but the punctured aorta would necessitate ligation, so the animal was abandoned to die under the anesthetic.

In the fourth experiment the right femoral vein of a dog was isolated, and used for injection instead of the artery. Oxygen was slowly injected for five minutes, the vein was then ligated, and the incision closed. The animal came out of the anesthetic in good shape and made a complete recovery.

In these experiments there were, unfortunately, no means at hand to measure the amount of oxygen injected. The dose of oxygen needed to saturate completely the blood may be computed from available data in authoritative works on physiology. The amount of oxygen necessary to keep the blood saturated may also be theoretically approximated. I am of the opinion, however, that a small amount of uncombined oxygen in the circulating blood is not fraught with great danger, and that such uncombined oxygen might, indeed, act as an antidote to certain poisons in the blood, including bacterial toxins.

Several conclusions might be drawn from these experiments, but the most important thing demonstrated is that oxygen can be freely introduced into the circulating blood, and that such injections are not necessarily fatal.



## HISTORICAL.

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### THE PRIVATE JOURNAL OF JAMES MARKHAM AMBLER, M. D., PASSED ASSISTANT SURGEON, UNITED STATES NAVY, AND MEDICAL OFFICER OF THE ARCTIC EXPLORING STEAMER "JEANNETTE."

#### INTRODUCTORY NOTE.

By J. D. GATEWOOD, Medical Director, United States Navy.

I am confident that at some time, sooner or later, a medical officer of the Navy will undertake to write, in more detail than has been attempted, a biography of James Markham Ambler, passed assistant surgeon, United States Navy, who perished with the first cutter's party in the retreat from the Arctic exploring steamer *Jeannette*.

Acting under that belief, I have gathered copies of certain records that are not found in the various accounts of the voyage of the *Jeannette*.

Foremost among these records is the private journal kept by Dr. Ambler during the retreat. It is the diary of a naturally reserved and strong man, carried on day by day, even in the face of death.

The photograph of Dr. Ambler is somewhat enlarged from one lent by his sister, from whom the originals of all the papers were received.<sup>1</sup>

There are few naval medical officers on the active list of to-day who have even heard of Dr. Ambler and of the voyage of the steamer *Jeannette*, which was crushed by the ice on June 12, 1881. Yet surely a few days can not be expended more profitably than in a study of the available literature relating to that ill-fated voyage.

The following references are suggested as sources of knowledge necessary to appreciate the most gallant struggle for life ever recorded in the history of Arctic expeditions:

1. Proceedings of a Court of Inquiry to Investigate the Loss of the *Jeannette*.
2. The Voyage of the *Jeannette*. The Ship and Ice Journals of George W. De Long. Edited by his wife, Emma De Long.
3. In the Lena Delta. By George W. Melville.

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<sup>1</sup> In addition to the material presented here, Dr. Gatewood has collated various newspaper clippings, as well as a most interesting addendum from his own pen bearing on disputed points regarding the expedition. The newspaper extracts are as follows:

Dr. Ambler's heroism. The manhood of the surgeon of the *Jeannette* expedition. New York Herald.  
Dr. Ambler at rest. The last journey to the home of his kindred. Services at the grave. New York Herald.

Surgeon Ambler's funeral. Another victim of the *Jeannette* expedition laid to rest.

Home to their graves. Burial of the remains of the Arctic explorers.

Copy of Dr. Ambler's parole when a prisoner of war as a member of the Confederate Cavalry.—Ed.

4. Lieutenant Danenhower's Narrative of the *Jeannette*.

5. James Markham Marshall Ambler. By John C. Wise, M. D. (Journal of the Association of Military Surgeons. Vol. XVIII, No. 5, May, 1906.)

6. Medical Journal of the *Jeannette*. (In files of the Bureau of Medicine and Surgery, Navy Department.)

7. The Great White North. By Wright.

The *Jeannette* was caught in the Arctic ice on September 6, 1879, and remained in the pack, drifting until June 12, 1881, when she was crushed, sinking at 4 a. m., June 13, 1881 (date of geographical position), in latitude  $77^{\circ} 15' N.$ ; longitude  $155^{\circ} 0' E.$

The officers and crew (33 souls in all) landed on the ice with sleds, boats, and supplies, and on June 17 began a retreat, making a southerly course over the ice to open water. They had three boats and five sleds to drag over the weary miles. The boats were on ship-made, heavy, oak runners, shod with whalebone. The first cutter with its runners weighed 3,000 pounds; the second cutter, 2,300 pounds; and the whaleboat, 2,500 pounds. The five sleds loaded weighed 6,600 pounds. The snow was knee deep at the start, the road very rough and the ice full of fissures. Each boat was too heavy to be dragged by its own crew, and consequently one boat had to be advanced at a time. Frequently 13 miles had to be traveled on foot to advance boats and sleds 1 mile. Certainly the situation was one requiring the pluck and endurance that rest upon a basis of cheerfulness even in the face of death itself.

The party traveled in this way with varying conditions of road and varying distances per day, over the frozen ocean until July 29—42 days of exceedingly frightful trials—when they landed on Bennett Island—new land discovered by the party—in latitude  $76^{\circ} 38' N.$ , longitude  $148^{\circ} 20' E.$  All hands left the island on August 6 under conditions more favorable to progress, as there was sufficient open water to permit no little travel by boats. However, they had to drag sleds and boats across floes, and camped on floes—one such camp lasted 10 days—when weather and condition of ice did not permit any attempt at progress. The last ration of bread was served out on August 18, coffee gave out soon after, and tobacco a little later. The last ration of lime juice was issued on August 30.

The party landed on Thaddeus Island on August 30; on Kotelnoi Island, September 4; and on Semenovski Island September 10, where a deer was killed—quite an event as all hands had been on reduced allowance of food for about 20 days.

Leaving Semenovski Island at 7.30 a. m. of September 12, the party had entirely open water on the afternoon of that date, when the last floe seen was utilized by crew of whaleboat in making repairs to that boat, stove in by the ice. But the wind and sea increasing, there



was a gale from the northeast that night, and between 9 and 10 p. m. the boats were out of sight of each other. The whaleboat (Melville) outsailing the others, soon was put on the port tack with wind and sea about four points on the quarter. She was then hove to at dark and passed the night riding to a drag made of tent poles and canvas. It was much of the time a question whether the boat could survive the force and fury of wind and sea. The second cutter (Chipp) did not survive—evidently foundered, as neither boat nor crew was ever heard of again. The first cutter (De Long and Ambler) kept on a southwest course. The step of mast carried away, and then, with lowered sail, she was hove to and made to ride out the night at a sea anchor or drag. But on September 13, in the forenoon, the boat shipping a good deal of water and keeping sea anchor abeam, attempt was made to ride under lee of sail. It was then that the sheet parted and sail and yard were lost. That accident dominated future events in relation to the 14 occupants of that boat and was probably ultimately responsible for the death of 12 of them.

The gale moderated about 6 p. m. of September 13, and about 8 p. m. the first cutter kept away to the westward under a jury sail made of a sled cover. On September 14 the wind settled to about south and the boat was making a west course of about 1 knot an hour. On September 15 to 17 the wind was light and at times the boat was becalmed. Oars were used on the 16th, and the boat pulled south, and at 9 a. m. of that date grounded in sight of low land running east and west. Then De Long must have known that he was west of Cape Barkin, which had been selected as the rendezvous for all three boats should they become separated. But, with no sail and with diminishing food, he could not hope to follow the coast to the eastward. He, therefore, struggled with the boat in the shallow water and finally worked her in to within  $1\frac{1}{2}$  miles of the shore, when, on September 17, all hands wading ashore and carrying supplies, the boat was abandoned with the intention to proceed on foot to the south and reach a settlement on the Lena River, in the delta of which the party knew itself to be. At the time of landing there were only six days' provisions on hand, but there were arms and ammunition and good hearts and hopes of game, and belief that the chances of getting through were good.

And the chances would have been very good indeed, if the party had been in possession of reliable information. It was not known that, after three months of exposure and heart-breaking experiences, they were only about 25 miles from a village where succor could have been obtained. North Belun, that distance to the westward of where De Long and Ambler landed, was not on any map, and, it is said, the existence of the village was not even known to the Russian Government. So, instead of going to the westward the party went south,



and all starved to death except two, Nindemann and Noros, who, sent ahead for succor on October 9, managed to ward off death until they happened on October 22—13 days away from the party—to be found by a native when themselves too weak to travel.

From the records you can follow the party in its sad wanderings south in the Lena Delta. They struggled on as only brave and well-disciplined men can. An occasional deer warded off starvation from time to time, but soon the chance of game vanished and then, on October 9, Nindemann and Noros were sent out ahead, when there was nothing left in the way of food except two ounces of alcohol per man.

Those left behind—De Long, Ambler, and nine others—for there had been one death following amputation of frozen feet—ate deer-skin scraps, deerskin footnips, and old boots, and drank willow tea after horrible nights. And yet they struggled on until—October 18, one death; October 21, two deaths; October 28, one death; October 29, one death; October 30, three deaths. There were left De Long, Ambler, and Ah Sam (cook), and they, leaving the bodies of the others, struggled along a few hundred yards farther south and laid themselves down on the snow for the last time.

And there their bodies were found in the following spring—March 23, 1882—found by Melville, who, with all the whaleboat's party had found succor by entering a river well south of Cape Barkin and falling in with natives.

The story of Melville's search for De Long and his party is full of absorbing interest. You can find it all in Melville's book, and you can see why he thought that Ambler was the last survivor, although Ambler made no record after October 20—the day he wrote that wonderful letter to his brother.

Certainly that party never lost its trust in God. While perishing there was "divine service." Dying day by day, trembling lips uttered the creed and the Lord's Prayer. When you read the records, you read a pitiful story. But you feel in the presence of strong men going down to death in body, yet dominated by the something in man that distinguishes him from all other created beings. There is seen throughout the records full recognition of the rights of each individual—not only official or naval rights, but also personal rights. The food was always evenly divided, the sick were always carefully considered, the strong always remained with and looked out for the weak. There was never a lack of order, there was never a lack of consideration, *there was never even a disregard of the proprieties.* Everything done was done with a view to the good of the party as a whole. There was no selfishness anywhere in evidence. No man died alone or away from words of comfort and help, and the last man (Ambler) "kept his lone watch to the last, on duty, on guard, under



arms." In this connection the following interesting quotation is made from Dr. Ambler's diary:

"*Sunday 9th, Oct. 1881.* Yesterday without food, except the alcohol. The Capt. spoke of giving the men option to-day of making their way as best they could, that he could not keep up. This occurred in the morning when we had made two miles that we had to retreat. I told him if he gave up I took command & that no one should leave him as long as I was alive. I then suggested that we send two men ahead to try to make the settlement, and that we make the best of our way with the rest of the party. This was done. Nindemann and Noros are ahead. God give them aid & we are getting along. The Capt. gave me the opportunity of going ahead myself, but I thought my duty required me with him & the main body for the present."

Such was ever the dominating spirit, and the incident given above has been perpetuated in bronze in a tablet erected by naval medical officers in memory of Dr. Ambler. It is found on the wall of the library of the Naval Medical School. It shows Nindemann and Noros disappearing in the distance. It shows Ambler remaining behind with that starving main body—Ambler, the last survivor of that body, and living some days after Nindemann and Noros got through. It shows the medical man who wrote in the direst extremity: "I thought my duty required me with him & the main body for the present"—the present was until death. And that tablet bears the splendid inscription: "DUTY STRONGER THAN LOVE OF LIFE."

But aside from the splendid courage and lofty faith of the controlling spirit of those men, a medical man will find much of interest in the medical aspect of the cruise of the *Jeannette*, and the medical work of one in whom duty was stronger than love of life. In that connection the words of Melville spoken when a witness before the court of inquiry investigating the loss of the *Jeannette* are of interest: "I desire to state particularly of Dr. Ambler, during the whole of the time that he was attached to the ship, in addition to the ordinary duties of the surgeon, he was always careful of the sanitary condition of the ship and the ship's company, always trying to devise some means for the health and well-being of the people in regard to air, light, ventilation, and care of the drinking water, the *Jeannette* being the first ship that I ever knew that has passed through two winters in the Arctic Ocean free from scurvy. This was wholly due to the skill, care, and attention bestowed on the sanitary condition of the ship and her people by Dr. Ambler. Further, I will say that, in addition to his duties as surgeon in the care of the sick, he acted as roadmaster, working like a laborer on the road, and after his sick list became comparatively free he volunteered to work on the dragropes the same as the seamen under all circumstances and at all times. There can be no more worthy man and surgeon than Dr. Ambler."



It is very notable that *there was not a single case of scurvy during the entire history of the crew of the Jeannette* and not a death until that period of wandering in the Lena Delta.

The following taken from De Long's diary is also interesting:

"May 4th, Tuesday. (1880). Should we be so fortunate as to return without having had the scurvy break out among us, I think it will be because we had pure water to drink, for I do not think that our situation is thus far any less prejudicial to general health than that of Tegethoff's or De Haven's Expedition, both of which wintered in the pack and were affected with scurvy to a considerable extent. But inasmuch as the Nares' Expedition were consuming water which was pure (according to the nitrate of silver test, as testified to by Dr. Moss), and yet broke down with scurvy, there may be some other cause to affect us which we have yet to learn (and avoid, for we do not want the proof by experience)."

One naturally thinks that the "some other cause" was made inoperative way back in December, 1879, as the following is found under that date:

"We have at times been troubled by not getting pure snow for drinking and cooking purposes, and as this may continue until we have a heavy snowfall (for our distiller is not perfect) I shall commence tomorrow the issue of a ration of one ounce of lime juice to every officer and man each day."

As a matter of fact a satisfactory source of drinking water, other than the distiller, was rarely, if ever, available, and the issue of lime juice was continued. By April 17, 1880, one of the three barrels of lime juice carried had been consumed. Then, upon consultation with Ambler, the consumption was reduced to an issue of an ounce on Tuesdays, Thursdays, and Saturdays. So important was that issue considered that it was carried even on the retreat from the *Jeannette*. Indeed, it was not until August 29, 1881, that the last ration of lime juice was issued.

The inability of the ship to obtain even a fair drinking water from ice and snow is quite interesting. Dr. Ambler made some noteworthy investigations, from that point of view, of ice found in the Arctic. (Appendix E of *Voyage of the Jeannette*, edited by Emma De Long.) The *Jeannette* never found a single piece of floe from which potable water could be obtained, and had so much difficulty in getting snow of proper purity that on November 28, 1879, a small boiler was rigged with a coil, and distilling commenced. It continued with little interruption, for the following is found under date of April 27, 1880:

"And yet we cannot find any snow fit to make drinking water. Try we ever so carefully, in our choice to take the newest fallen, to seek the crevices where snow may have lodged on other snow, escap-



ing ice contact, the result is the same, with this exception, I almost believe, that the newest fallen is the saltiest. Using such snow for drinking or cooking is out of the question."

The distilling of water took 60 pounds of precious coal each day. In July, 1880, the *Jeannette* did succeed in filling its tank with snow water that was considered sufficiently pure for drinking. Distillation was stopped and each day snow was selected with great care, placed in barrels, and brought to the ship. Then a cupful from each barrel was melted and the water tested. But even snow in the same barrel varied greatly in saline content and thus it was found after a short experience that distillation was the only method of securing satisfactory water. There was certainly a strong opinion on the *Jeannette* that excess salt in the intake greatly predisposed to scurvy. And on the retreat over the ice the question of securing drinking water comparatively free from salt was always uppermost. In that period the following is found:

"The snow, or rather ice, is *fresh to the taste*, but the doctor, by a nitrate of silver test, finds it much too salty. However, we cannot help ourselves, and must with lime juice, which we take daily, try to avert the danger."

They selected the oldest and highest hummocks and scraped off the broken-down crystals whenever they could find any. On the retreat, June 30, they found pools of water on top of the old ice, but the water contained much salt.

The nature of Danenhower's case will be apparent to any medical man. Under date of January 22, 1880, the following is found in De Long's journal:

"Danenhower's case has so far become worse that the doctor to-day informed me that unless an operation were performed he would in all probability lose the sight of his left eye. The circumstances of our surroundings, the poor accommodations for sick people, and the possible emergency of our having to abandon the ship and take to the floe, make the performance of the necessary operation a risky affair for Danenhower. For, should he be exposed to hardships and privations incidental to a march over the ice, he would quite probably lose his eye. Under the circumstances I advised the doctor to give Danenhower a voice in deciding for or against the operation. After some consideration Danenhower decided to have it done, and it was beautifully performed by Dr. Ambler, and borne with heroic endurance by the patient. I hardly know which to admire the most, the skill and celerity of the surgeon, or the nerve and endurance of Danenhower."

It was in June, 1881, a short time before the ship was crushed, that cases of lead poisoning began to appear. The cases were finally traced to consumption of canned tomatoes. In view of having to abandon the ship on June 12, these cases of lead poisoning were quite a calamity.

Certainly one reads of their occurrence with much interest, especially in relation to the general question of canned food during long voyages.

This much has been written to stimulate interest in the voyage of the *Jeannette*, and in that wonderful retreat from the ship over the frozen ocean and on into the desolation of the Lena Delta. It is a wonderful story—too extensive to be told in this note made to introduce the worn and water-marked diary of Dr. Ambler, the last survivor of that gallant band lost in the Lena Delta.

And the original diary of which this note introduces a mere copy! It is a little notebook with greatly damaged leather back. It is written in lead pencil and its leaves have been marked by melting snow and ice. It was found wrapped in a long woolen muffler, which to ease the gnawing pangs of hunger had been wedged under the waistband. It is truly a message from the dead—from one who "was ever cheerful and fearless of death, and I know he faced it calmly and manfully as he had done before on the field of battle. He came of a brave family, and if the world might read a single page of his private journal there would be no doubt of his unfailing courage and fortitude to the bitter end."



(The inscription below stands alone as the title-page of Dr. Ambler's diary as it appears in the diary. The date was due to De Long's decision not to make the change incident to crossing the one hundred and eightieth meridian. The ship was drifting and was considered liable to recross that meridian at any time. The geographical date was June 12, 1881, the ship having been deserted on that date. She sank on June 13. The diary is not decipherable at times, owing to the effects of water.)

J. M. AMBLER, M. D., P. A. SURGEON, U. S. N.

ARCTIC STR. JEANNETTE, WRECKED

JUNE 11th, 1881.

*Camp on Ice floe Lat. N. 77° 14', Long. E. 155°. June 12th, 1881. (Monday.)* The sick are no worse for their experience on the ice. Mr. Chipp<sup>1</sup> got very little sleep, but his stomach is quiet. I have used whiskey oz. ii three times daily, his bowels were moved naturally.

Nindemann & the steward are about, attending to work. Mr. Danenhower's eye stands fairly well, he is attending to such duty for his sled party as is necessary, being cautious as possible about exposure.

Mr. Newcomb's (two lines not decipherable).

*June 13th, 1881.* In camp. Alexae and Kuehne both have gastralgia to-day. Mr. Chipp is improving. I gave him Iod. Pot. gr. v *ter die*. Continue the whiskey.

*June 14th, 1881.* In camp. Mr. Chipp improving. Kuehne pain continues. Alexae (blank).

Steward rather better. Busy all day arranging \* \* \* &c.

*June 15th, 1881.* In camp on floe. Mr. Chipp improving, continue whiskey & Pot. Iod. Kuehne rather better to-day. Whiskey & Pot. Iod. cont. Alexae's stomach irritable and bowels constipated \* \* \* whiskey & \* \* \*.

Steward improving. Pot. Iod. Busy packing \* \* \* hauling, stowing everything snug. Weather good. Sun very warm. The thermometer marked only 23 F.

*June 16th, 1881.* Mr. Chipp improving. c. t. Kuehne better. c. t. Alexae better. Constipated. Less pain. Steward, pain this a. m., feels better to-night. Pain due to imprudent eating.

Saw provision list and ration for sled journey. No suggestions. Temp. 21 F.

*Camp. No. 2. June 18, 1881. 10 p. m.* Started at 6 p. m. of 17th, worked until 6 a. m. of 18th—turned in. Melville, Danen-

<sup>1</sup> For detailed list of complements of the three boats see p. 217.

hower, and I worked with the cutter & our party of men carried her along well, we advanced her to the farthest flag and returned to bring up a sled. On my way back someone came up to me from the cutter saying that Lauterbach had fallen with cramps. I went back to him, sending Mr. Newcomb on to meet the hospital sled and bring up my traveling case, which he did quickly.

I found the man suffering a good deal. Laid my coat on the snow for him to lie on, kneaded his belly vigorously, made him jump on his legs, and when the case arrived gave him brandy and opium. I got him easier, left Mr. N. with him. On my way back met the hospital sled, & found the sick party, Mr. Chipp at their head, drawing it, they were much exhausted. The dogs would not work and they had upset several times.

I gave them all a drink of whiskey and made them rest, and advised Mr. C. to hold on at the place Lauterbach was left, where there were some provisions—he however managed to push on to the cutter and pitched a tent. They had to come back to this point when the whole party camped down and were very much exhausted when they arrived. The steward lost his Pot. Iod.—all that I had. After leaving the H. sled, I proceeded on to camp No. 1, found a general smash up of sleds, the captain had advanced the whaleboat and 2nd cutter and four sled, two of the latter had broken down. Sled No. 5 was still in camp. On our way back to it, from not seeing well through my glasses, I stepped on some fresh ice in an open lead & went in up to my hips.

My sled when we commenced to haul it also broke down. To-night Mr. Chipp is pretty tired looking, says he feels quite well, can eat, but looks worn & weak. I gave Quinine and whiskey *ter in die*. Kuehne, Alexae and steward are on the mend. Lauterbach is better.

*Sunday 19th, 10 p. m.* Camp No. 3. Hospital tent at 1st cutter Brought forward the sick, Mr. Chipp, Mr. Danenhower, Lauterbach & Alexae, with hospital stores on dog sled, and a tent. Mr. Chipp is rather faint after exertion, but will lend a hand. Sent Kuehne and the steward to duty. Mr. Melville came up with 2nd cutter, and Mr. Collins came to the tent complaining of his chest & said he could not get back. Melville sled not with him. I had a little water melted and made some beef tea.

*Monday 20th, 12 p. m.* Sick improving. In camp. Rain and sleet. Setting up No. 5 sled again. Lauterbach not in so much pain. Gave cod liver oil as purgative.

*Tuesday 21st, 9 p. m.* In camp at cutter—all sleds started forward—Boats, Hospital stores, & navigation stores with all the sick. Remaining here for present, will advance in afternoon. Mr. Danenhower's eye has so far stood exposure well, fortunately there has been very little sun. Quinine & counter irritation. Mr. Chipp had



some pain last night & this morning vomited his brkfst. Pain not of same character as before. Takes 2 grains quinine daily & spt. as usual. Lauterbach had cramp again yesterday P. M. passed a good night tho & feels easier this A. M. Very small hard scybala last eve. Gave about 2 ounces of cod liver oil this A. M. to try its effect on bowels. Lee has cramp in legs after exertion. I have myself passed blood freely from bowels on one occasion & slightly this A. M.

*Wednesday 8.30 A. M.* Hard work ever since started. Carried sick forward, ferried over lead by Mr. Melville's party, got on small floe with boats. I pitched hospital tent with Mr. Danenhower's assistance. All hands had dinner. Boats moved forward. Ordered to remain until the last. Left on the floe alone with the sick and one well man attending line to bridge pieces got adrift. Captain came back, floes came together, he sent me forward with the sick & brought up tent & sled. I crossed to boat with sick on old floe, went back to edge and lent a hand in getting things over.

*Wednesday 8.20 p. m. June 22nd.* In camp with sick at the boats. Melville advancing sleds. Mr. Chipp has had return of pain, passed a bad night, due probably to the bad time we had yesterday, wet, cold, etc. Mr. Danenhower's eye holds its own. Lauterbach better this A. M., bowels blown out freely. Alexae still complaining. Runs to me about every trifle. Mr. Dunbar has diarrhoea for which I gave him some brandy & 10 drops of Tr. Opii this A. M. Resumed potash Iod. for Mr. Chipp.

*Thursday 10 p. m. 23rd.* At advance with the sick and hospital stores. Mr. Chipp somewhat better, no pain in bowels, was quite tired out when we reached this spot. Legs cramped. I shampooed them and they are easier. Mr. Danenhower's eye in same condition, so far the cloudy weather has been in his favor. Alexae still constipated but does not complain so much, he is much depressed and cried last night when I talked to him. His leg is improving. Lauterbach went to duty to-day. Lee's leg gave out after one or two trips & the glands in his groin are painful and swollen. Dressler had some pain from piles. Gave him some ointment.

In camp on old floe piece. *Friday 24th 1881. 6.10 A. M.* Made the best distance to-day (night) than ever before. Mr. Chipp a good deal exhausted and very weak. Alexae is better but his morale is gone. Everyone else keeps up well. Travelling looks promising for tomorrow.

*Friday 24th, 6.45 p. m.* All hands called at 6 o'clock. Find that Chipp has had a bad time of it. Great deal of pain & cramp & very restless. His pulse is 90, rapid for him. He is very thin and very weak.

*Saturday morning 8.30 A. M. 25th.* Alexae to whom I gave a suppository before turning in had a small movement from bowels,



he is much brighter and feels better. Mr. Danenhower's eye was somewhat inflamed when we made our start 6.45 p. m. Friday, but he staid in the hospital tent a great deal to-day and this A. M. (bed-time) it looks better. When we started from our noon (midnight) stop Mr. Chipp was so much exhausted that he had to be assisted to dress himself & I brought him into camp on the Hospital sled. I had to give him small quantities of brandy at short intervals beside his regular two ounces *ter die*. He does not like beef tea & takes but little of it. We have nothing else now but pemmican, bread & cheese. The circumstances are all against him and unless he can eat more his case will be serious. I gave him lime juice in his brandy to-day, before it has affected his stomach. Mr. Chipp, Mr. Danenhower & Alexae form Co. Q. The two latter work.

*Saturday 10.40 P. M. 25th 1881.* Mr. Chipp had quite a good sleep since turning in and feels better. Gave brandy 2 oz. before brkfst. He took beef tea & coffee, one hardtack. Mr. Danenhower's eye looks fairly well. Alexae feels quite well to-day, had movement from bowels. We will not move until after our dinner to-day 12 midnight. The Captain got an observation in last 24 hrs. Lat.  $77^{\circ} 41' N.$  Long.  $152^{\circ} 15' E.$  We have gone 24 miles to the north-west from where the ship went down. Our course will be altered to the S. W. to-day so as to slant across the floe to the most northern land.

*Sunday morning 9 A. M. bedtime 26th, 1881.* In camp. 3-4 miles advance since dinner. Road better than usual. Chipp stood it very well, has eaten more to-day. No pain in either bowels or legs & was not very tired when we reached camp. Had one bad place to cross on floating piece but had assistance and got over without trouble.

*Sunday 8.45 P. M. June 26th, 1881.* Up at 6 P. M. issued alcohol for breakfast—was called off & did not carry Chipp his spirit. Chipp passed a very good night, eat his brkfst, and says he feels quite well. He was feeling so well that he did not think he would send for his brandy as he knew I was busy. Danenhower's eye holds its own, sometimes flushes up but quiets down when he can get inside the tent. Alexae is doing well, his leg is improving. Last night found it so warm in my bag that I crawled out and slept on top of it, covering my feet and my legs with my coat. Outside temperature 28 F. We are still on about a S. course. The wind to-day is a little S. & W. The Captain and Melville are worried a good deal with their hands burnt and swollen by the sun. Some of the men have their noses and lips burnt. Lee gets on fairly well at bridge making. His legs still give him trouble. I use a liniment on them every night.



*Monday June 27th, 1881. 9.20 A. M.* Made about a mile \* \* \*. Terrible in getting over leads. Chipp got along very well. Danenhower's eye inflamed tonight.

*Monday 9 P. M. June 27, 1881.* Breakfasted and sleds advancing. Chipp a good deal better. Bowels moved last evening and this A. M. and feels stronger. Danenhower's eye rather clearer than when we turned in. Directed him to keep in tent as much as possible. Alexae, dressed sore with lint & sealed up with collodion tonight.

*Tuesday 7.30 A. M. June 28.* Made about  $\frac{3}{4}$  mile good to-day. Chipp came through very well, his appetite keeps up and his strength is improving, has had no pain or cramps for the last two days. Danenhower's eye a little engorged this A. M., not so much as last bed time; so far the rest in sleep has restored it by the time we get on the march. The road to-day was easier. Had two bad leads, one very troublesome, & delayed us some time. The other we got everything on a small cake & ferried over together. I then got ahead with the hospital sled and pitched the tent before the boats came up. The men appear to stand it pretty well, but the work is very difficult and they have to go over the ground very often.

Lee complains of not being able to eat and some uneasiness about stomach. Gave him some pills. His legs are somewhat better. He works at road making and does not pull on the sled.

*In camp. Tuesday 9 P. M. June 28th, 1881.* Chipp doing well. Danenhower same. Alexae improving. Cold this P. M. Did not sleep well. Wind S. E. We are probably making more northing by the drift than we are southing by hauling. Going west however all the time.

*Wednesday June 29th, 1881. 9.20 A. M.* About turning in. Much annoyed to-day by my two sick friends, both seem to think I should make such recommendations as they would like, & that I shd be guided by their wishes. I do not think a man was ever cursed with two such patients before and under such circumstances.

*Wednesday 8.20 P. M. Thursday 30, 9 A. M.* Chipp doing well, strength improving. Danenhower's eye looks rather worse tonight. Alexae doing well.

Was put in charge of the road party & worked hard all day with pick & notwithstanding the Captain's conclusion this morning, I was sent back at dinner time to bring up the sick and the sled. I had told him that I thought they did not require my attention the whole day. So I was over the whole road three times, once pulling and hauling a sled, & over a great part of it five times, working with pick, digging a road, & when I got to camp at night sent back to bring up sick & sled, to receive the sneers of our blessed invalids. They heard some pretty plain talk.



*Friday July 1st, 1881, 9 A. M.* Chipp improving. Danenhower same. Alexae at work to-day, but dress leg & bandage. Worked hard all day cutting hummocks and bridging. Got knocked overboard by the "Walrus" and had to swim around from one piece of ice to another, got out all right & went to the whaleboat for my knapsack. Found it at the bottom, of course, and then had to strip and dress in a wind with rain & sleet.

*Friday 8.40 P. M. July 1, 1881.* Chipp doing tolerably well. Danenhower's eye looks better to-day. Alexae. Leg about same. Slept rather better but as I slept on two pair of wet drawers and a wet vest, without sleeves to my shirt and with only half of a blanket over me, it was not the most cheerful bed I ever had, but "*Comme Je Trouve*" & I feel pretty well this morning and ready for work. Rain & mist prevailing.

*Sunday 8.30 A. M. July 3rd, 1881.* Chipp doing well. Tr. Zing. (?) gtt(?) v. Danenhower's eye quiet. Alexae's leg has not been injured by work so far. I myself, Mr. Melville, Star & one or two others have had slight diarrhoea, due I think to the grease (tallow) in the pemmican. Made a good leg to-day—2 miles at least—and not a very bad road. I did not get overboard to-day, & except from the soreness of my muscles am pretty well. I worked hard all day yesterday with a pick and very tough work it was. I suppose I cut more than a ton from one cake that was in the way & by the time the boats came up the ice had shifted & I had to come back and cut as much more. Making bridges and cutting roadways on the face of a lump, prying (?) &c. bevelling a face into a road & all that, gives a pretty lively time. Then sleeping in wet clothes in a wet bag on wet ice makes every bone & separate muscle ache in the morning. To-day I have not been able to draw a breath without pain. I feel better tonight and "*Comme Je Trouve*" I hope to get in training by and by.

*Monday, July 4th, 1881. 7 A. M.* Have made about two miles to-day on our course. Chipp when we started considered himself all right and wanted to go to duty. I stopped his whiskey and let him keep on without it in easy stages. Tonight he does not feel well and has had some pain. Danenhower's eye is in the same condition. He takes quinine & I use counter-irritation over the brow. Alexae, leg improving altho he does a great deal of running all day. Not much road cutting to-day. Lee told me how to prepare clams. I find the thoughts of a good many are running on eating. We could eat more bread and sugar if we had it.

*Tuesday, July 5th, 1881. 8 A. M.* Chipp—renewed whiskey to-day and tonight, he is in better condition than last night. He is pale & his pulse is weak. His bowels were moved out this A.M. He does not sleep well. Danenhower—Eye rather more inflamed than usual



probably due to the fall of snow to-day giving more glare. Alexae—Leg is doing well. He has had a return of pain to his stomach. Gave him 3 C. C. p. I am myself in a good deal of pain in my right lung lower lobe of a pleuritic character. I lose my wind quickly when I work with the pick, & I have a very severe pain.

*Wednesday, July 6th, 1881. 7.30 P. M.* Made I suppose about two miles yesterday (Tuesday P. M. & Wednesday A. M.), Crossed several leads by ferrying. I think a good deal of time is lost uselessly. I did a good deal of work that proved to be unnecessary or was rendered useless by changes in the ice before the train could come up. If I had four good men and allowed to manage the business I could make a much better road & be of more use & the men would save by levelling, with a few blows of the pick, more lifting than they can possibly do. As it is I have one man who can hardly get over the ground on account of his legs. He cannot trust to them & in a ticklish place he is of no account at all. On solid ground he can pick well. He cannot get over a crack 3 ft. wide. The other is possibly the smallest and weakest man in the party. He has not the force to work nor has he much idea of working beyond piddling; this latter is the Naturalist so called, & has lived in the officer's mess. He has not yet learned to obey without speaking. Mr. Chipp stood the tramp yesterday very well & slept well last night. Treatment continued. Mr. Danenhower's eye did very well yesterday and looked rather better last night. Alexae's stomach is very irritable. He cannot eat anything we have without vomiting & it is apparently useless to try to move his bowels with C. C. p. His leg is doing well & I have ceased to bandage it. It is rather depressing to our two friends \* \* \* that they are in the vocative (?) & they have probably plenty of food for reflection. I should think that both of them would feel great mortification. They are an incumbrance by their own wilful acts. One man came from home knowing that he was diseased, and that he was liable to be laid up, & concealed it as long as possible. The other when warned and advised by me of his condition set himself in opposition & showed so much obstinacy and want of sense that nothing could be done for him, and he refused to obey my direction when on the sick list and acted directly contrary to it.

*Thursday July 7th, 7 A. M.* Staid in camp all day. Rain, sleet & snow. Putting 1st cutter on sled to be ready for start in morning. Men have had a chance to fix their foot gear. Going to bed in a few minutes.

*Friday July 8th, 1881. 8 A. M.* Bad luck to-day. Lost at least 2 hrs. ferrying when we could have made the distance in 20 minutes by going around. The worst road has never delayed us as much as a short ferry. I am convinced that the Captain cannot see with the glasses he uses. To-day a long line was passed by a boat just before



dinner and fastened to the side we stopped. Later on we had occasion for line & there were only short pieces in the dingy which were in use. The captain asked for more line. I asked if he had had the long line brought up, he said "no." I then asked if I should have the word passed for someone to get it. He again said "no." He would have it that to get it we would have to send the dingy back. I reminded him that it was on the same side as we were. He said he "knew it, but that it could not be got at without the dingy," as it was fast to loose pieces. Now I was sure that this was not the case & as one of my men whom I knew to be very thoughtful had passed the line, I still had hopes of seeing it & accordingly later in the evening I found it in the dingy. Manson had gone back after dinner & after the sleds had been advanced & got the line. So we still have it & it is like to prove very useful in many ways, either as lashing or for ferrying, some of it being walrus hide.

Mr. Chipp is improving. Mr. Danenhower. Cont. same. Alexae complains and does not eat I believe, yet to-day says he feels better, his bowels moved slightly to-day.

*Saturday July 9th, 1881. 8.15 A. M.* Chipp—Condition same. Danenhower—No change. Alexae—Doing well. Struck an old floe piece to-day & think we have made 3 miles good which means 21 travelled. Very much aggravated this A. M. by Mr. N. He will get himself hurt if he dont desist. I have been a mile beyond the camp working the road for tomorrow. Had some heavy picking. A huge block that I was moving struck my right knee & caused intense pain for a time, it was my lame knee, of course. My lung does not trouble me so much now, but I feel some pain all the time from it. We have a W. N. W. wind & I hope it may give us some southing.

*Sunday July 10th, 1881. 8 A. M.* Chipp improving slowly. Does not gain strength very fast, though he has gained a good deal in the last 10 days. I do not consider him fit to do the duty to which he would be ordered. Mr. Danenhower's eye holds its own as well as I expected. It flushes up, but a little rest in the tent at night generally restores it.

*Monday July 11th, 1881. 7.30 P. M.* Chipp did very well yesterday. Improving. Danenhower's condition same. Was very tired this morning and turned in, in a good deal of pain from my chest. I have the poorest help I ever saw. Miserable sled and boat, broken down dogs. One man who can't walk & the other who cannot pick, only one pick of any account & some useless oars rigged as chisels. Both men slow, one from nature the other because he does not intend to do anything & pretends not to understand.

*Wednesday July 13th, 1881. 7.5 A. M.* Chipp doing pretty well. Got another can of tongue for him this (our) morning. Danenhower,



no change. Had some rough leads to cross to-day. Cold work hauling line and one is sure to get wet. When the 2nd cutter came in I was standing near where she stopped, looking after my medical stores. My attention was attracted by Mr. Melville giving an order to Star to pick up some covers for the soles of boots. Instead of obeying the order Star said something about their, the covers, being on a sleeping bag. Mr. Melville again ordered him to pick them up, saying that they were his. Star did not obey but went on talking in rather a grumbling tone, I do not remember the words. The captain was standing near, who then ordered Star to stop talking and to pick up the covers. The man still continued to speak, and the captain repeated his order. He (Star) then started towards the covers still talking, when the captain again repeated the order for him to stop talking & to do as he was told.

*Thursday July 14th, 1881. 8.30 A. M.* Chipp, improving. Danenhower, holding his own. Had some tough picking to-day, cutting causeways & making roads over hummocks, bridging leads, &c. Two men were overboard to-day. I do not work as much with the pick as I did day before yesterday. I dismissed Mr. Newcomb by the Captain's order & got Johnston in his place, a very happy exchange for me in every respect. The best of the two remaining picks was lost on the same day. Mr. N. had a line fast in solid ice with the pick as an anchor, & he had properly secured it, but it was dragged overboard and the line by which it was tied on parted, & it disappeared much to my regret. The general health of the party is good and we get on as well as could be expected under the circumstances. There is some complaint about the rations being rather short in some of the messes, but so far in my tent everybody is satisfied. I think I have the best lot of men in every respect—no grumbling and no talkers. My side gives me less trouble now, but at night I find it pretty painful, and I have a good deal of trouble turning over. I drive the dinky on the tumble cart with a broken down lot of dogs, & I find it as disagreeable work as I ever did. The knots and tangles they can get in are surprising & to pass the dog at the end of a line thro' the bight of knot, is about as soul provoking and cause for profound and deep swearing as a man could wish. I generally get wet every day and more or less of the skin taken off from some part of me. My hands are cut and skinned and corns on all the fingers & besides they sometimes get the cramps & are powerless.

*Friday July 15th, 1881. 7.42 A. M.* Chipp doing well. Danenhower cond. same. Seal shot this afternoon by Mr. Collins at our dinner camp. We ate him tonight for supper. Made a stew, put a little pemmican and beef tea with it and some water. It tasted very



well for a change. I ate a good allowance, but at the last did not fancy it as much as when I started.

*36th day. Sat. July 16th, 1.30 P. M.* Chipp doing well. Danenhower no change. 6 cans of pemmican lost overboard to-day by Erickson. A little sense would have saved them. Not 15 feet away was a perfectly safe passage.  $\frac{2}{C. C.}$  came up & I pointed it out & said I thought the other sled had better go that way; but "no, this was the way." In a few minutes the man sled came up and it & one man were effectually landed overboard, no necessity for it at all. A little later  $\frac{2}{C. C.}$  himself got overboard, up to his neck, for which visitation of Providence I was thoroughly resigned.

*Sunday July 17, 1881. 1 A. M.* Chipp returned to duty. Treatment will be cont. for the present. Danenhower cond. same. Mr. Chipp relieves Mr. M. in charge of boats and sleds & Mr. M. relieves me in road-making. I fall back to my legitimate duty as medical officer & do nothing special in any other way, but look out for serving alcohol. 8.40 A. M. Short day, the time long in passing, lounged along from one place to the other. Island much plainer and open water visible. Chipp seemed to stand the work all right. To-day (18th really land time) is the Little Lady's birthday. She must be twenty-one to-day if I remember rightly. We had a pleasant time 3 yrs. ago to-day. I drank her health in the best I had, a tin cup of tea at supper. I have taken a rifle and will keep ahead hereafter in hopes of a shot at a seal. I can not stand around doing nothing when other people are at work, & altho there is nothing for me to do now unless I hitch on the drag-rope, I do not think the time has come yet, tho I am ready for it at any time.

*Monday July 18th, 1881. 8 A. M.* Danenhower's eye remains in same condition. Have just turned in. Had a tramp of 5 hrs. this P. M. Started as soon as I had eaten dinner with Mr. Dunbar to proceed as far as possible toward the island, and supposed open water to the west. We went about four (4) miles I think. The water faded and what at noon looked like open water close at hand, looked at our furthest point like land a long way off, the ice extending to the horizon. We had a good glass and Mr. D. agreed that there was no water, altho he had been positive when we started, and I also.

*Tuesday July 19th, 1881. 8.30 A. M.* Have just stopped for supper at the farthest point reached by Mr. Dunbar and myself yesterday. It is variously estimated from our camp of last night, i. e., from 3-5 miles. I think it more than three. The island is plainly visible to-day & everyone agrees we were right in our report of last night. The captain thinks he can see open water, but I am not sure of it. He wishes to cross the lead tonight, so we will not camp here.



It will be a rough passage & I will be glad to see everything over safely. Old rotten ice with pools of water on every side. I have been over, but had some lively jumping.

*Wednesday July 20th, 1881. 9 A. M.* Worked our passage until 3 A. M. of Tuesday. Very rough & hard work. Got to a large piece at last & camped until 1 A. M. to-day, then got through to this place on edge of solid ice. Foxie found drowned this A. M. Killed a walrus, my first. Collins got the first shot into him as we were crossing the lead. I followed him up and found him, & shot him five times, every time in the skull. The last bullet shot him right through the spinal marrow where it forms the brain, shattering the condyle. Mr. Dunbar was very active, got a line through his flipper before he was dead.

*Thursday July 21st, 1881. 4.30 A. M.* Mr. Danenhower, cond. same. Eat walrus stew for supper & for brkfst—not bad. Advanced a mile this P. M. Came to moving ice in extensive lead. Cold, rain & fog. Wind strong from northward and loose ice moving quite rapidly. We have camped for the night. Mr. N. has got himself salted at last, he richly deserves it.

*Friday July 22nd, 1881. 9 A. M.* Mr. Danenhower, no change. Mile and half made to-day toward the island. We drifted quite rapidly last night I think. Fog lifted a little this morning & we could see it plainly. Since 12 P. M. have not been able to see it.

*Saturday July 23rd, 1881. 8.30 A. M.* Mr. Danenhower's cond. same. Mile & half made good to-day. We have neared the island very much. When the fog lifted as we camped we looked right on it. Black precipitous cliffs of a dark almost blue color, with a table land running back to a high whaleback covered with snow. The island is deeply indented on this face. Quite a large deep bay & several smaller ones. Water is 20 fathoms where we are. Distance from island roughly estimated from 3 to 12 miles.

*Sunday. July 24th, 1881. 7.30 A. M.* Danenhower. Eye same. Made about two miles & half. Island seems to recede as we approach; the last  $\frac{1}{4}$  mile over flying bridges, very tedious. Mr. Collins shot a seal & he was secured; too late for supper tonight, but we will eat him tomorrow.

*Monday July 25th, (3.30 P. M.) Later.* Danenhower's condition same. It is now 24 hrs. since we commenced work this or rather yesterday night. The island has again eluded us. Ice moving, breaking, opening, closing, heaving up & again depressed, the whole mass alive. Such work by men could never have been done before & I hope may never be done again. Provision sleds with all our grub carried over breaking cakes of ice too light to float them. The men going like the rush of a whirlwind, & in some cases actually jumping the sled over several feet from block to block of rolling & sinking ice.



I have seen something of men in trying times, but I have yet to see men who will equal these. For 40 days we have been under way, with all kinds of what are considered by the world as hardships; but not a murmur & tonight after 19 hours of work, many of the men having been overboard, they are cheerful and come up smiling. We have had damnable luck to-day. Mr. Dunbar & myself got within  $\frac{1}{4}$  of a mile of the shore, saw excellent sledding the rest of the way, went back to report, found the last lead all adrift and the devil to pay generally, and so it has been the whole 24 hrs, mist, rain, & fog coming down and shutting out everything, fog lifts and you have been cart-wheeled into some other position. I have myself done no work but moving on my feet & jumping from block to block and if the other men's legs are as much done up in proportion as mine I am sorry for them. By the way, I find my old boyhood habit of taking long jumps stands me in good stead these days. I find I can go where Mr. Dunbar does without the aid of a pike, and jump too with a Remington rifle on my back & a weight of clothing that is rather unusual.

*Tuesday, July 26th, 1881.* Mr. Danenhower's condition same. On ice floe reached last night. Island impracticable tonight. Cold, fog, rain and high wind. We are spinning round & round slowly drifting down the lead. High precipitous cliffs, glacier just off us.

*Wednesday, July 27th, 1881. 12 M.* Mr. Danenhower's cond. same. Still on floe piece. Island not visible on account of fog. Think we are drifting before the wind in moveable pack, as wind holds in same quarter, blowing on the tent.

*Thursday, July 28th, 1881. 9 P.M.* Reached island this P.M. between 5 & 6 o'clock. Had to jump for it as there was a lively motion in the pack. We had some very bad leads to cross. At one time we were all together with all of our stuff on a small cake of ice when the fog lifted and showed the cliff just above us apparently. We made a larger piece, then another, & then a lively break over moving small pieces to the land-ice. It was quick work done successfully. Two or three men overboard. After supper crew mustered, marched ashore & the Capt took possession of it, named it Bennett island & American soil.

*Saturday, July 30th, 1881. 5.30 P.M.* Date changed to-day to proper time for eastern longitude. Mr. Danenhower's eye C. S. Found good deal of trap-rock, injected pieces, tufa &c. The cliff formed of igneous rock, strata of the face almost horizontal. Between the strata of trap & extending at intervals or rather between six definite strata of the face is a looser mass of various thickness made up of smaller pieces of rotten and feldspatic rock. Numerous pieces of lava found, and trap with silica stuck in like plum pudding. The lava is of various colors, some yellowish-green, other pieces red. A



peculiar white stone, presenting to me very much the appearance of gypsum is found. Mr. Melville says that it is cryolite, and Iverson, who worked in the Greenland mines, also says so. I hardly think it is. I am inclined to think it carbonate of lime in some form. It effervesces when touched with  $\text{HCl}$ . I found embedded in a piece of trap, a regular stalactite formation. I also found an amethyst of a decided purple tinge but not deep at all; red & white clay almost stone, but leaving a red mark when drawn on the surface of a dark rock, easily cut. The so-called cryolite can be cut or scraped with a knife. A piece of petrified wood was also found by Johnson, who found likewise an antler of a reindeer high up on the mountain, various mosses with red & white flowers, scurvy-grass, two species of grass & a yellow flower with peculiar ovary found. Coal has been found in large quantities inside of cliff below here. Nine dozen murre(?) killed & driftwood found to cook at least two meals. Birds killed with stones. There are rookeries in the cliffs above us, a continuous noise going on ever since we have been here. I found two nests in the rock and tried very hard on a bird but he got out of another hole & escaped. Found my bottle of turpentine broken and all the turpentine wasted. On Wednesday 27th, one bottle of brandy was also broken and the entire contents lost.

*Sunday July 31st, 1881. 8 P. M.* Mr. Danenhower, C. S. No sun since we have been here, fog nearly all the time, occasional rain. Bird diet—old ones tough, young tender. Coal burns fairly well. The cliffs would be no end of richness to a geologist. I found some very peculiar stones. Broke down about  $\frac{1}{2}$  ton of trap-rock, found it studded with crystals white & red quartz with some yellow, topaz, I think in the seams where the cliff has separated in places I worked out sheets of lime  $\frac{1}{8}$  inch thick. Breaking into the mass of trap, white, red & yellow quartz, sometimes in perfect crystals and groups of same, are found, they can be easily enucleated leaving a smooth mold. The white stone spoken of yesterday is probably carbonate of lime. The masses of crystals enucleated generally very easily, due probably to frost.

*August 1st, 1881. 9 P. M.* Mr. Danenhower doing well. I had very severe diarrhoea last night and this morning, out very often, very profuse. Good deal of pain—took some opium Tr. & brandy, took tonight Tr. Opii. Found on the cliff to-day some white & yellow crystals stuck in basalt, stone very soft, breaks down easily leaving sand between fingers, in some places around the crystals saw a fine grained bright red clay. Not much of it. I found also in some of the lower trap in the cavity between masses of small yellow & white crystals, some very fine, beautiful specimens, they are I think a silicate of lime. Looked at by a glass they showed perfectly



clear & transparent, they had some elasticity and would bend from line when gently touched.

*August 3rd, 1881. 8 P. M.* Have been sick and in my bag for last 24 hrs.—yesterday had a very painful day. Mr. Danenhower doing well. Mr. Chipp returned this A. M.

*August 4th, 1881. 8 P. M.* Mr. Danenhower. Eye little inflamed. Stopped Mr. Chipp's whiskey to-day. I am all right again. No start made to-day on account of bad weather.

*August 5th, 1881. 9 P. M.* Mr. Danenhower, cond. same. Shot 10 dogs to-day. I am billeted in 1st cutter, a change from the whaleboat. Weather continues bad.

*Saturday, August 6th, 1881.* Mr. Danenhower, eye inflamed. Removed an eyelash from lower lid, which had caused the trouble.

Left the island in boats this A. M., made rather more than 2 miles over the water to large floe piece. Boats made two trips each, dinner at 3 P. M. After noon, sleds drawn across the floe, & boats came around in a lead. Helped to work 1st cutter. Young ice making in lead tonight, bad show for us.

*Sunday August 7th, 1881.* Mr. Danenhower. Cond. same. Boating again, my tent broken up, & men sent to mess with their boats. I am in the Capt. tent. Had a good lead this morning, probably more than three miles, boating and sledding we have made at least four.

*Monday August 8th, 1881.* Mr. Danenhower—eye inflamed to-day. Had a bad day of it, loading boats, crossing leads, hauling out, loading sleds, carrying over ice, sometimes portaging. Wet work and not much made. My boots gave out at dinner time & I had to take a pair I had laid up in ordinary in my knapsack, feet are wet all the time & the comfort of my own tent is missed.

*Tuesday August 9th, 10 P. M. 1881.* Mr. Danenhower—Eye not so much inflamed, treat. cont. Made at least 8 miles to-day, struck a rich lead & had comparatively an easy time, only a little cold & wet; only two dogs left, the rest lost, except Prince & Pill Garlic—shot.

*Wednesday, August 10th, 1881.* Mr. Danenhower's eye still congested this morning but not so much. Wilson had a cramp in stomach. Tr. Opii. Made about 12 miles to-day to S. W. Ice much slacker only hauled out once, promises well for open water. Snow storm, cramped in boats, wet and toes very cold, however one gets used to it & it is not so bad as one would have thought. Will go on after supper.

*Thursday August 11th, 1881.* Mr. Danenhower. Eye not so much congested. Made 17 miles yesterday & 20 to-day at 10 P. M.; fine leads all the morning, a little devious this P. M.



*Friday August 12th, 1881.* Mr. Danenhower—Eye a little congested, he thinks he can see better & that his sight is improving, but I am not sure of it. Made about 4 miles this A. M. & hauled up, working a packed lead. Sun came out & we dried clothing, worked tonight about a mile to the westward, wind is coming and may help us.

*Sunday August 14th, 1881.* Mr. Danenhower—Congestion of lower lid flared up, the eye so far has done very well, we have had little or no sun and it has not been exposed to light to any great extent. He is very anxious to get to duty, & from his very peculiar mind he has I think gotten the idea in his head that he is being unjustly treated. It is true that he is able to get along quite well, that he has not broken down; before we started he thought that his chances were *nil* tho I told him I thought he would pull through all right, and was always anxious for me to take the eye out. Now that it has turned out as I predicted, he takes the other tack, considers himself a sound man & has given any amount of annoyance in his repeated attempts to get himself placed on duty. I do not consider any man who has the affection that he has & whom I know to be liable to break down at any time, that his eye is exposed to a strong light, a fit man to be put in charge of a boat & party of men under any circumstances, & that it would be wholly unwarrantable in our condition. This, I believe he has so far failed to see & has, I have no doubt, a fixed idea that there is a combination to keep him out of what he considers to be his right. I am led to this conclusion by my knowledge of the man after two years' experience & after having had frequent opportunities of witnessing the idiosyncrasies of his mind in matters connected with himself.

Did not make much headway to-day, leads jammed and covered with young ice.

*Monday August 15th, 1881.* Mr. Danenhower, eye looks quite well this P. M., treat. continued.

Had hard time this forenoon, hauled over an old ice floe more than a mile to make  $\frac{1}{2}$ , then got into a lead full of young ice and snow, extremely tough. Stopped for dinner. The sun came out & we have found more open leads. Our course has been very devious, but I think we have made five miles southing. Mr. Dunbar shot a seal at dinner time & we will eat him now for supper, cooked by & in his own blubber. I got a fall to-day, but caught myself before I got more than one leg in.

*Tuesday August 16th, 1881.* Mr. Danenhower—Condition same. Bad day to-day, very little made, hard work, packed lead & snow storm, hauled out at 4 p. m. & will camp down here for the night. A northwester would help us but the Fates seem to be against us.



*Wednesday August 17, 1881.* Mr. Danenhower—Condition same, removed lash from eye. Struck good leads to-day and made some progress, probably ten miles. Plenty of seal and some oogook seen. 31 shots fired but nothing obtained, tho several hits.

*Thursday. August 18th, 1881.* Mr. Danenhower, eye a good deal inflamed tonight had a cold head wind most of the afternoon which probably caused it.

Had bad luck with the leads this A. M. Worked to the N. W. and had to haul up at 10 A. M.; got dinner by 12 M., had a seal—then got through into open water & had a lively wind from the N. W. that we had to run into for a while, but made about 6 miles on our course to the S. W. for the day's work & have hauled out for the night, the wind still continues & the ice is moving quite fast. The sleds are a great nuisance towing astern, hold us back and interfere with the steering. Will dismiss the Walrus tonight.

*Friday August 19th, 1881.* Mr. Danenhower. Eye doing better to-day.

Struck it fat to-day, with leads & running right; the 2nd cutter met with an accident, stove a hole in her bow and delayed us for 3 hrs. We have made about 16 miles southing & have probably struck an open pack. Erickson excused from duty to-day, very uncomfortable from a bad cold, chilly & shivering the whole time. Gave brandy during the day, oz. iii, & a Dover's powder tonight.

*Saturday August 20, 1881.* Mr. Danenhower.—Eye doing quite well to-day. T. C. Island of New Siberia lies to southwest of us, about 12 miles off. Long. by assumed latitude put us  $148^{\circ} 50' E.$ ; drifting to the westward. Erickson & Dressler both under the weather with colds, faces swollen. They are rather better tonight. Bread given out to-day;  $1\frac{1}{4}$  lb. of pemmican *per diem*.

*Sunday August 21st, 1881.* 8 A. M. Danenhower—Eyelid red & congested, vessels showing on sclerotic. I had to report him this morning to the captain for causing unnecessary delay & using disrespectful and unbecoming language to me as a medical officer in the presence of an enlisted man. Mr. D. has made some difficulty about coming to the tent, does not like to, in fact, and I have tried to make it as little disagreeable to him, as possible, until recently going to him, until one occasion about 3 days ago I went to him & he made some objection to my examining his eye at the time saying that he was busy. Since then the hour of sick call was changed at my request and I have made a point of waiting for him at the tent. This morning he was out & I saw him standing around, he also saw me, I think (I had told him I would always be ready to see him as soon as I was dressed & as soon thereafter as he might be so) after some time he spoke remarking that there was good light (?) where he was. I told him there was an excellent one in the tent. He



came in, & remarked that his breakfast was waiting for him. I then said that I also had been waiting for him, & reminded him that yesterday after I had notified him that I was ready I had to wait some time, & when he did come he said that he was busy at the time tying up something (his bag probably) & had waited until he finished. (He had made no answer to the message I had sent him by the steward.) He then said that he did not wish his eye to be examined & had asked to be taken off the list 6 weeks ago. I told him that he was not fit to be taken off the list (meaning that his eye was not in a fit condition for him to do duty). He remarked with some asperity that he *was* fit to do duty, thus flatly contradicting me & implying that I was keeping him on the list improperly. His manner at the time & during the whole conversation was exasperated in tone, & under the circumstances, being in presence of others I considered disrespectful & unbecoming.

Erickson & Dressler are improving. Mr. Newcomb has taken a cold and this morning is very uncomfortable and feverish.

*Monday. August 22nd, 1881.* Mr. Danenhower's eye doing quite well, secretes mucus rather freely from lids. Dressler & Erickson returned to duty this A. M. Mr. Newcomb has not been out to-day but is very much better.

*Tuesday. August 23rd, 1881.* Mr. Danenhower doing tolerably well, pinkish under lower part of cornea. Mr. Newcomb well.

Still in camp. No water, ice jammed by wind on the island.

*Wednesday. August 24th, 1881.* Mr. Danenhower.—Eye & lid inflamed rather more than usual, tho there is no pain or uneasy feeling. Treat. continued.

Still in camp ice jammed on us. D. *loquitur* to M.—his policy was not to make war on anyone unless he was attacked but that he had some "political influence" & if necessary would rake over something or other—probably his idea of a defense of himself. Seal.—Brkfst & supper.

*Thursday. Aug. 25th, 1881.* Mr. Danenhower. Eye looked quite well this A. M., tonight it is flushed up again. Still on the floe—ice tighter than hell, all day—opening a little tonight but I believe will jam in again unless we have a wind.

*Friday. August 26th, 1881.* Mr. Danenhower. Eye less congested tonight. T. C.

Ice still jammed on us, wind light, drifting to S. E.

*Saturday. August 27th, 1881.* Mr. Danenhower. Eye doing quite well to-day.

Still no opening. Have been without sugar for two days, & have had my last smoke tonight.

*Sunday. August 28th, 1881.* Mr. Danenhower. Eye a little inflamed to-day, fresh fall of snow. C. T.

Wilson excused from duty to-day, pemmican gives him the belly-ache—had some diarrhoea. Land seen bearing E. by N. this A. M. Supposed to be water at first, but was land beyond a doubt when I saw it, probably New Siberia, & the previous picked up Faddejewskoi.

*Monday. August 29th, 1881.* Mr. Danenhower, left eye muddy and congested—it has been quite cold in boat. Left the camp about 1 P. M. & have made about 10 miles southing. I think we are well through the cut between the two islands having drifted last night rapidly.

*Tuesday. August 30th, 1881.* Mr. Danenhower. Left eye muddy & congested, noticed him using R. eye a good deal writing to-day, apparently. Landed on Thaddeus island this evening, took a walk, fresh tracks of deer, horns which I think recent are in the velvet. Track made since melting. \* \* \* found in summer water courses.

*Aug. 30th, 1881. Wednesday.* Mr. Danenhower—Eye congested & muddy this morning. Right eye also a little complained of. Some pain in shin bones. Ordered Iodide of Pot. Left Faddi' this A. M., sailed around S. cape and are on our way for small island, all night job. Hope to reach it by morning & may make Kotelnai tomorrow night, could not land on S. W. end of Faddi, water too shoal—16 inches, 500 yards from shore. Saw winter huts &c.

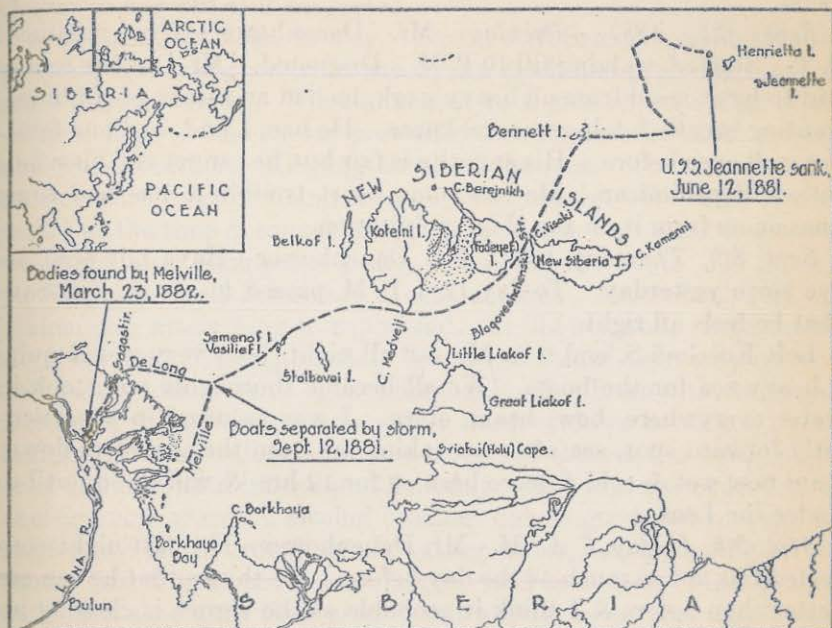
*September 1st, 1881. Thursday.* Mr. Danenhower—Eye same. For last 36 hours under way. Up all last night, miserable time in boat, struck the shoal & pounded around for hours, finally got away about 3 A. M. & again this morning fell in with it. Got the boat pretty full of water, after we got under way made good running, probably more than five knots per hr., but very wet & cold, taking in water continuously, boat crowded. Temperature somewhere about 20 F. for the last two days. Tonight I am wet from my waist down, all my underclothing,—my top coat is frozen. I have been so stiff & numb from cramp & cold that at times, except for my brain working, I should not know of my very existence. Last night was very trying on everyone & everybody is probably in as bad a condition as myself, if not worse, but they all stand it without complaint. The 2nd cutter is behind again. Mem. *Alch v.*

*Friday. Sept. 2nd, 1881.* Mr. Danenhower—Right eye clearing, left eye still congested, no pain in shins. Stopped the Iodide, & renewed the Quin. Still on the floe piece of last night. Land sighted about 4 P. M. to-day, S. end of Kotelnai probably. We have been all turned in almost the whole day since brkfst. took dinner in bag & went to sleep again. Ice pack around us again & nothing seen of second cutter up to this time, a signal flag hoisted about 5-6 P. M.



Wind still continues, but is in puffs. Snowstorm. Everything wet & everyone more or less uncomfortable. Before leaving our camp on August 29th I divided the whiskey & brandy between the boats—2 qts. to the 2nd cutter & whaleboat each, 3 qts. & some ounces I kept with myself in the 1st cutter.

*Saturday. Sept. 3rd, 1881.* Mr. Danenhower—Eye looks rather better, treatment continued. 2nd cutter came down the edge of the pack to the northward of us. She had laid up a little before us on account of heavy weather she was making. Chipp & Kuehne came over to our camp about supper time. They hauled over floe this



The north Siberian coast, with dotted line showing the course of the party to the Lena Delta.

A. M. at 10, got into lead along the sand spit & had beautiful running all day. We are still jammed in the ice & the wind continues.

*Sunday Sept. 4th, 1881.* Mr. Danenhower—Eye doing quite well. Still an angry look to the lower half. We moved over the edge of the pack by Mr. Chipp & got under way by two P. M. Ran until between 5 & 6, struck a sand spit on eastern side of Kotelnai not laid down on the chart. I got three seas plump into my lap, wetting me from the hips down, very uncomfortable. In crossing the floe yesterday I noticed Mr. Danenhower especially & I did not think that he got over the ice as well as he supposes & had occasion to call Mr. Melville's attention to him. The water used tonight is from a pool in the sand bank & is salty from surf breaking, but not any more so than the snow we have been using lately. This A. M. I recommended that the

snow freshly fallen during the night should be used. Our "executive" imagined probably that he was the only man of sufficient acumen to discover it I suppose, for he felt it necessary to inform Capt. of the fact & to recommend the use of snow.

*Sept. 5th, 1881. Monday.* Mr. Danenhower—Eye remains quiet. Mr. Chipp & myself took a walk of five miles or so over the spit & across the beach to the main land. Found entrance of river. Came back about 4½ P. M. Found Lee in front of the tent and from his manner & utterance was convinced that he had been at the alcohol or medical stores. He was a little more unsteady on his legs than usual.

*Sept. 6th, 1881. Tuesday.* Mr. Danenhower—Eye inflamed. C. T. Started, walking till 10 P. M. Disgusted. Mr. Dunbar to-day had to be excused from all heavy work, he had an attack of giddiness, wanting breath & felt great weakness. He has, I find, had one fainting spell once before. His appetite is fair but he cannot eat his whole ration of pemmican. He has some heart trouble & has had some uneasiness from it on the ship; palpitation.

*Sept. 8th, Thursday 1881.* Mr. Danenhower—Have not seen his eye since yesterday. To-day 12-1 P. M. passed in \* \* \*. Says that he feels all right.

Left Kotelnoi S. end 9 A. M., ran all night, boat very wet & quite a heavy sea for the boats. We all became thoroughly wet, took in water everywhere, bow, beam, stern. I was as usual in a particularly forward spot, sea after sea taking me from the shoulders down. I am now wet & cold & have been so for 12 hrs. & will be so until in under the Lena.

*Sept. 9th, Friday, 5 A. M.* Mr. Danenhower—Eye last night congested but not so much as the day before. He thinks that he can see better than before & I think it probable as the cornea is clearing up rather well. I shall only examine his eye once a day hereafter. I have very little quinine left. We hauled up on a small cake of ice yesterday at 4 P. M. & camped. I am and every one else nearly done up. I think that I really am the wettest in my tent at any rate.

*Saturday 10th, Sept.* Mr. Danenhower, Eye yesterday same. Mr. Dunbar still continues to feel weak & has attacks of faintness. I have supplied him with a Phial of brandy, oz. ii; directed him to ask Mr. Chipp for more when that was gone, to be supplied from the bottle given his boat.

*P. M.* Mr. Danenhower's eye was a good deal inflamed to-day. Landed on Semenovski for dinner. Party walked down toward the end of island & found two reindeer. Shot the doe. We came into a bay on the west side of the island & camped, cut up the deer and had a meal at once, although we had just finished dinner about two miles above; it was excellent. I went up the island after lunch to



our dinner camp, but did not see the fawn. He had evidently gone up to the other end of the island. The island is a mere strip of earth varying in places from an hundred feet high to the level of high water. Where it has been brushed by the sea in places the breadth runs from a very narrow strip, wide enough for a roadway, to at least a  $\frac{1}{4}$  of a mile. It will probably disappear in course of a few years and be only a chain of islets. I found the portion of the tooth of a mastodon in one of the tumuli & a tusk was also found. Ptarmigan in several flocks.

*Sunday Sept. 11th, 1881.* Mr. Danenhower—Eye looks rather clearer to-day but still congested.

*Ostrowa. Sept. 18th, Sunday. 1881.* Left Semenovski on Monday morning last, had good wind and by 6 o'clock had probably made 40 miles on our course. Wind increased to a gale shortly after & the whaleboat passed us on our port side, then apparently making tolerably good weather. Keeping ahead of the seas. The second cutter on our port quarter doing as well as ourselves. We were doubly reefed at the time & commenced to take in seas over stern & quarter, two right after each other nearly swamping the boat. We got her partially baled out before she caught another. Part of one reef was shaken out, attempting to run ahead. It did no good. Seas caught us all the time blowing a gale. Whaleboat out of sight on port bow. 2nd cutter lost astern. This about 8 P. M. From that time gale increased, carried away our mast at the foot & we became a wreck, taking in water, wallowing in the trough of the sea the whole night, next day and until morning of Tuesday. Sail & mast secured to an anchor made of sail & alcohol breaker, did no good, boat would not steer & we lay in trough of sea taking water, baling, baling all the time. Sail & boat cover were bagged and both lost. Mast & oars, with pick axe, were then used & did a little better; at night wind, went down & we rigged jury sail. God knows where we went during the night. There was no sleep for 36 hrs. 2nd night baling continually. On Wednesday it was calm & we drifted along. Sometime in the afternoon of Wednesday the Capt. complained of cold feet & hands & had a nervous chuckle in his throat. I gave him two drinks of brandy during the P. M. He got into his bag & staid there until we got within half mile of the shore on Saturday evening the 17th. His feet were a little swollen and his hands quite sore. The cold at times was intense & we had a hard time of it generally with the wet & snow. On Friday morning we found ourselves in 6 ft. of water & young ice near at hand. Shortly after we made land to the southward & tried to get to it but grounded a couple of miles off, in foot & half of water. On Sat. we pulled in as close as possible, the men all, with exception of the Capt., myself, Erickson & Boyd, got out of the boat and tried to pull her in. By wading ashore several times they



lightened her so as to get her in where we all came ashore, wading & carrying all we could. Erickson, Sam, and Boyd are suffering a good deal. Erickson's feet swollen & blistered, oedematous, & toes blue, legs swollen & hard. Sam not so bad & Boyd still better.

*September 19th, 1881. Monday.* Erickson legs & feet improving. Under surface of left foot blistered, opened it and let out watery serum, bloody. Renewed dressing of vaseline, cotton batting & bandage. Boyd improving, Sam improving, one foot still painful.

*Thursday 20th, Sept. 1881.* Erickson, Sam, & Boyd are in about the same condition this morning, not improved by the short walk of yesterday P. M. when we made a start. We have been under way this A. M. for an hour. Erickson & Boyd are making slow progress & are suffering a good deal of pain. Our outlook at this rate is a poor one. We must move on & get to the river.

*5 P. M.* In camp on river. Had hard time getting Erickson along, he laid down on the roadside and asked to be left, that he could not go on. This was in 200 yds. of dinner camp. Capt. & I went back & got him up & brought him up to the rest of the party. Whilst we were going a herd of deer were seen & Nindemann & Alexae went in pursuit. We waited their return, they had followed them to this point. We then got underway, Capt. & I bringing up the rear with Erickson. The latter did pretty well, made an effort & made the mile to this place better than I expected. Nindemann, Collins, & Alexae are out hunting. God grant they may kill a deer, we are sadly in need, tho not yet in absolute want.

*Thursday. Sept. 22nd, 1881.* Indian Lodge. We made about 4 miles yesterday & have come to the river we expected. Found two huts in tolerable repair. Capt. determined to halt & on consulting I found he had determined to remain here & send two men ahead, to get through if they could & get assistance if possible. Nindemann was to go with me. I thought it the only chance and was willing to try it, & less compunction about leaving as I thought the chance of surviving the winter here was as good as making a hundred miles over unknown country without sufficient food for the journey or shelter at this season of the year. I think there was a chance & I thought it should be done if possible.

Last night Alexae who had gone out in the P. M. came back & brought the haunch of deer; he had shot two, thank God. We had turned in for the night after our "frugal," but it did not take us long to start a fire & fry pan. We ate heartily & slept tolerably well afterwards. To-day Erickson's legs are in a better condition, he has feeling in his toes & the swelling has gone out of his legs to some extent, no more bullae form. The feet look red except the toes which are still purplish white. He will probably lose the skin from the front of both feet, but a rest here of a couple of days may improve



him, so we can work the whole party out of the delta, where the chances of living through will be better. Boyd is doing well & I hope will be all right. Sam has improved, but just now is in pain.

*Friday. Sept. 23rd, 1881.* Erickson has improved, he has less pain, the swelling & hardness have diminished, the leg is still a little boggy above the ankle (both), sensation is restored to the feet under the old dead skin. Skin, from forward part under surface both feet, loose, & serum beneath that drains away on upper surface. Skin dead back to metatarso-phalangeal joint. Punctured upper surface to let out bloody serum, toes feel warmer & more natural. He is more cheerful & tho ordinarily a man in his condition should lay up, yet if he can move our circumstances are such that we must go on, & he with us. Boyd's feet are very much improved & I think that he can keep up. Sam also. The rest of the party have more or less of aches & pains, but that is to be expected.

*Saturday. Sept. 24th, 1881.* All of sick are improved, we start to the south at once.

*Sunday. Sept. 25th, 1881.* Sick doing as well as could be expected. Kept up well yesterday. Erickson is improving. Made only about 5 miles yesterday, as more than  $\frac{1}{2}$  of the day was lost in an attempt to construct a raft that I did not think would carry the party if it could have been properly made. I broke through the ice in crossing a creek & got wet up to my thighs. Froze as soon as came out of water. Camp made late & a miserable night passed by all hands.  
\* \* \*

*Monday. Sept. 26th, 1881.* Made 12 miles yesterday about. Hard work, very hard. Had a godsend in the way of a hut at night, held us all quite well. Deer meat gone, short dinner yesterday, short supper & brkfst of pemmican to-day. Pemmican will eke out until tomorrow noon. Sick, except Erickson, are nearly well. Found the skin gone from palmar surface right foot inner side, about size of a silver \$. He walked better & feels no pain. The ulcer looks healthy. The feet & legs generally have improved. This A. M. examined foot find muscular sheath exposed & parts running serum quite freely. There is no bad smell & the sore looks healthy & gives no pain when he stands upon it. I have dressed it with carbolized vaseline, applied lint & cotton batting & a bandage. I think he can move to-day better than he will be able to later. We are on a promontory, & God knows whether the raft about to be built will convey us or whether we have a long march around ahead of us.

*Tuesday. Sept. 27th, 1881.* Crossed on the raft yesterday, answered the purpose quite well, but it took us until 3.30 P. M. We made 3-4 miles up the river, camped on the bank & slept by a fire. Erickson's feet look very bad, they have sloughed more than I thought, & are certainly in poor condition, but we must move on



as every mile brings us nearer striking distance of a settlement. We cannot offer to carry him as all the men are loaded to their full strength, & as long as he can walk he will have to do so. We have but one ration of pemmican left between  $\frac{1}{4}$ — $\frac{1}{2}$  of a pound & we have been living on that for a day & half. Temp. 22 F., 10 A. M. As we were about to start deer were seen & Nindemann & Alexae started. Alexae killed a deer (buck), thank God.

*Wednesday. Sept. 28th, 1881. 3.35 P. M.* The buck was a godsend, a large fellow & gave us a grand feed & about 90 lbs. to carry. We made about 4 miles & slept on the bank of the river again by a fire. Had a bad time of it myself, the half raw meat disagrees with me. Erickson's foot is very bad. The skin has sloughed extensively from plantar surface under metatarsal bones & also some of the muscular tissue of right foot. I am afraid that the same thing will occur on left foot. We are obliged to move on & so far he has been able to keep up, but God knows how long this will continue & the man must finally break down. If we can find a settlement soon I am in hopes of saving his feet but, if not, his feet & possibly his life & that of the whole party would be sacrificed, for no man will be left alone. Boyd & Sam are nearly as well as the rest of us. All of us are more or less used up. Iverson has chillblains on his toes that are very painful, & I do not think any of us have our strength. It was very heavy walking yesterday & to-day we have come to at an old hut on promontory which we have repaired & will spend the rest of the day & night. The branch of the river making to the North is very large and the captain thinks we have come to the main river where it breaks up. I hope it is so & that we may find some means of crossing. Yesterday we found the track of a man on the beach & this A. M. two were seen. God grant that our smoke or fire may be seen by some party who can give us assistance.

*Thursday. Sept. 29th, 1881.* Still in old hut living on deer  $1\frac{1}{2}$  lbs. per diem. Sam & Boyd off the list. Erickson is in a bad way, both feet sloughing badly, exposing tendons & muscles. He has complained of stiffness in his jaw & loss of power in right side. I keep him free from pain at night & give him sleep; dress foot with lint & carbolic acid. The result will probably be death from lockjaw. Alexae killed a gull and we are trying to catch fish.

*Friday. Sept. 30th, 1881.* Removed four toes from right foot & one from left foot sawing near the tarso-metatarsal junction.

(Note. Then follow two pages of which very little can be read. The whole diary is in lead pencil and the two pages appear as though something hard had been carried between them, rubbing the penciled words until they are now decipherable only as a few words here and there.

He seems to close the entry of Sept. 30th with statement, that if the party moves Erickson will have to be dragged.



It appears that on *Saturday, Oct. 1st*, there was additional operative work on Erickson, removing all but one toe. All hands then crossed the river, dragging Erickson on a sled made by Nindemann. Little more than one day's ration left.

On *Sunday, Oct. 2nd*, all were out and before the fire by 4.30 a. m., having had little sleep since midnight, on account of the cold and Erickson's talking in his sleep. The day ended with almost no food on hand and the party had traveled about 10 miles, camping near wood for fire.

On *Oct. 3rd, Monday*, tea was served out at midnight, as it was so cold and wretched. That day ate all deer meat remaining, and had nothing left except  $\frac{1}{4}$  lb. of pemmican each and a half starved dog. Erickson failing and delirious at times. Party made five miles in forenoon, crossed river on ice, then did some useless walking to a supposed hut, then made camp, killed dog, made fire, ate dog meat and had 27 lbs. left. Erickson delirious all night.

*Oct. 4th.* "Had a horrible night on the river bank." Erickson got his gloves off and hands were frozen. He was unconscious and was lashed on sled. Made a hut. Erickson sinking.  $\frac{1}{2}$  lb. of dog meat for each one and a cup of tea.

*Wednesday, Oct. 5th.* (There is a description of Erickson's condition but it cannot be made out.) No breakfast. At 6 p. m.  $\frac{1}{2}$  lb. of dog meat per man—tea from old tea leaves. Still in hut.

"*Thursday Oct. 6, 1881.* Erickson died at 8.45 A. M. Peace to his soul.")

*Friday, Oct. 7th, 1881.* Left hut this A. M. Ate our last meat at hut. Alcohol oz. i for dinner with water boiled in tea leaves. We have struck the main river I think, the mountains are visible. We stopped here 3 P. M. to build a fire several of our people having fallen in the river attempting to cross. Alexae is out hunting. God in his mercy grant that he may succeed in getting some game. Later he shot one grouse.

*Sunday. 9th, Oct. 1881.* Yesterday without food except the alcohol, the Capt. spoke of giving the men option to-day of making their way as best they could, that he could not keep up. This occurred in the morning when we had made two miles that we had to retreat. I told him if he gave up I took command & that no one should leave him as long as I was alive. I then suggested that we send two men ahead to try to make the settlement, and that we make the best of our way with the rest of the party. This was done. Nindemann & Noros are ahead, God give them aid & we are getting along. The Capt. gave me the option of going ahead myself, but I thought my duty required me with him & the main body for the present. Lee is about broken down. Alexae has shot 3 grouse by God's aid, & we will now have something to eat.

*Wednesday. Oct. 12th, 1881.* We have been without food since Sunday except one oz. of alcohol, dram 1 of glycerine yesterday & to-day, we have made no progress since Monday up to 3 o'clock. Wind & snow against us, we have been lying in hollow in river bank.

*October 18th, 1881.* Alexae died last night of exhaustion from hunger & exposure.

NOTE.—The above is the last entry in the diary as such. Turning over a number of blank pages, one comes to the letter below, which is of a later and the last date.

ON THE LENA,  
Thursday, Oct. 20, 1881.

TO EDWARD AMBLER, Esqr.

*Markham P. O. Fauquier Co., Va.*

MY DEAR BROTHER: I write these lines in the faint hope that by God's merciful Providence they may reach you all at home. I have myself now very little hope of surviving. We have been without food for nearly 2 weeks, with the exception of 4 ptarmigans amongst 11 of us. We are growing weaker, and for more than a week have had no food. We can barely manage to get wood enough now to keep warm & in a day or two that will be passed. I write my brother to you all, my Mother, Sister, Brother Cary & his wife & family, to assure you of the deep love I now & have always borne you. If it had been God's will for me to have seen you all again I had hoped to have enjoyed the peace of home living once more. My mother knows how my heart has been bound to hers since my earliest years. God bless her on earth & prolong her life in peace & comfort. May his blessing rest upon you all. As for myself, I am resigned & bow my head in submission to the Divine Will. My love to my Sister & Brother Cary. God's blessing on them & you. To all my friends & relations a long farewell. Let the Howards know I thought of them to the last & let Mrs. Pegram also know that she & her nieces were constantly in my thoughts.

God in his infinite mercy grant that these lines may reach you. I write them in full faith & confidence in help of our Lord Jesus Christ.

Your loving brother,

J. M. AMBLER.

NOTE.—In the back of the little leather-bound, water-marked, and dilapidated book is a rough sketch of the geological formation of Bennett Island. This is followed by a menu or diet while on the ice as follows:

#### DIET WHILE ON THE ICE.

##### *Breakfast.*

4 oz. Pemmican .....	24 oz.
1 oz. Ham .....	6 oz.
$\frac{1}{6}$ lb. Bread .....	1 lb.
2 oz. Coffee .....	12 oz.
$\frac{2}{3}$ oz. Sugar .....	4 oz.

##### *Dinner.*

8 oz. Pemmican .....	3 lbs.
1 oz. Liebig's Ext .....	6 oz.
$\frac{1}{2}$ oz. Tea .....	3 oz.
$\frac{2}{3}$ oz. Sugar .....	4 oz.
$\frac{1}{6}$ lb. Bread .....	1 lb.



*Supper.*

4 oz. Pemmican .....	24 oz.
1 oz. Tongue .....	8 oz.
$\frac{1}{2}$ oz. Tea .....	3 oz.
$\frac{3}{4}$ oz. Sugar .....	4 oz.
$\frac{1}{8}$ lb. Bread .....	1 lb.

Then follows a list of those in the first cutter.<sup>1</sup>

*First Cutter's Crew. Landed on the Lena Delta.*

Geo. W. De Long .....	U. S. N. Lieut.
J. M. Ambler .....	U. S. N. P. A. Surgeon.
J. J. Collins .....	Reporter.
Nindemann .....	Seaman.
Dressler .....	Seaman.
Erickson .....	Seaman.
Boyd .....	2nd C. Fireman.
Iverson .....	Coal Heaver.
Lee .....	Machinist.
Goertz .....	Seaman.
Kaack .....	Seaman.
Noros .....	Seaman.
Ah Sam .....	Cook.
Alexae .....	Indian Hunter.

The last leaf of the little book contains the following:

ZETΣ ΣΩΤΗΡ ΚΑΙ ΝΙΚΗ.<sup>2</sup>

Ship lost 12th June .....	77° 15' N. 155 E.
Bennett Island .....	76° 38' N. 150 30' E.

## FINDING THE BODIES.

The following is taken from Melville's *In the Lena Delta*, page 333.

\* \* \* De Long had crawled off to the northward and about ten feet from Ah Sam, while Doctor Ambler was stretched out between—his feet nearly touching the latter, and his head resting on a line with De Long's knees. He lay almost prone on his face with his right arm extended under him, and his left hand raised to his mouth. In the agony of death he had bitten deep into the flesh between his thumb

<sup>1</sup> Second Cutter's Crew: Charles W. Chipp, lieutenant, U. S. N.; William Dunbar, seaman (ice pilot); Alfred Sweetman, seaman; Henry D. Warren, seaman; Peter E. Johnson, seaman; Edward Starr, seaman; Albert G. Kuehne, seaman; Walter Sharvell, coalheaver.

Whaleboat's Crew: George W. Melville, chief-engineer, U. S. N.; John W. Danenhower, lieutenant; Mr. Raymond L. Newcomb (naturalist and taxidermist); John Cole, seaman; James H. Bartlett, fireman; Herbert W. Leach, seaman; Henry Wilson, seaman; Frank E. Manson, seaman; Charles Tong Sing, seaman; John Lauterbach, coalheaver; Aneguin, seaman (dog-driver and hunter).—From *The Voyage of the Jeannette*, p. 899.

<sup>2</sup> God Deliverer and Conqueror.

and forefinger, and around his head the snow was stained with blood. None of the three had boots or mittens on, their legs and feet being covered with strips of woollen blanket and pieces of the tent cloth, bound around to the knees with bits of rope and the waist belts of their comrades. Ah Sam had on a pair of red knit San Francisco socks, the heels and toes of which were entirely worn away.

When Nindemann joined me I showed him the three bodies as yet undisturbed, and the articles I had gathered together, including the journal, from which De Long had torn away three-quarters of a page; but as the opposite one on which the last entry has been made was not filled out, it was plain that no record was missing. I then told Nindemann to thoroughly search the bodies, directing him to cut the clothing in the vicinity of the pockets, and all of the many small things he found I tied up in separate packages and marked, so that no scrap of paper or article of any kind might be lost. I did not then take an inventory of these things, because of the intense cold. In all the pockets were scraps of old sealskin clothing, boots, and trousers, which had been crisped in the fire, some of it with the hair on the hide. De Long's pistol was missing. I knew he had one, and that he had carried it from the time the ship was crushed until we parted company. It was originally the property of Mr. Danenhower, who, while we were encamped on the ice preparing for our long march, had thrown it, together with some ammunition, into the sea—as he then supposed. But a thin sheet of ice covered the lead, which shortly before had been open water, and over this, instead of sinking, the pistol went skimming. So afterwards, when De Long found himself without a pistol, he directed one of the men to secure Danenhower's for him; and now failing to see it on his person I thought no more at the time than that he had thrown it away because of its weight. Chipp had given his pistol to Ah Sam, who clung to it until death.

The three bodies were all frozen in the snow, so that it was necessary to pry them loose with a stick of timber. In turning over Dr. Ambler, I was surprised to find De Long's pistol in his right hand, and then, observing the blood-stained mouth, beard, and snow, I at first thought that he had put a violent end to his misery. A careful examination, however, of the mouth and head revealed no wound, and, releasing the pistol from its tenacious death grip, I saw that only three of its chambers contained cartridges, which were all *loaded*, and then knew, of course, that he could not have harmed himself else one or more of the capsules would be empty.

(I am particular in noting this fact, because of a painful story which has gone the rounds of the press, to the effect that Dr. Ambler took his own life. This is utterly false. The doctor was ever cheerful and fearless of death, and I know he faced it calmly and manfully as he had done before on the field of battle. He came of a brave family, and if the world might read a single page of his private journal there would be no doubt of his unfaltering courage and fortitude to the bitter end.

I believe him to have been the last of the unfortunate party to perish. When Ah Sam had been stretched out and his hands crossed upon his breast, De Long apparently crawled away and died. Then, solitary and famishing, in that desolate scene of death, Dr. Ambler seems to have taken the pistol from the corpse of De Long, doubtless in the hope that some bird or beast might come to prey upon the bodies and afford him food—perhaps alone to protect his dead comrades from molestation—in either case, or both, there he kept his lone watch to the last, on duty, on guard, under arms.)



## SUGGESTED DEVICES.

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### IODIZED CATGUT; DRYING, STERILIZING, AND STORING.

By MARY M. ROBINSON, Nurse, United States Navy.

The following method of drying, sterilizing, and storing iodized catgut has been successfully used since February, 1915, at the Naval Hospital, Philadelphia:

The strands of catgut are cut into 30-inch lengths and made into small coils about the size of a half dollar. By twisting the last free end three or four times around the components of the small coil the latter is enabled to maintain its shape. These coils are strung like beads upon a thread so that any desired number can be conveniently handled by simply grasping the thread. The string of catgut is suspended on two glass rods, which are fastened on a small iron stand (the iron is covered with gauze), and placed on the sterilizer to dry. The temperature is gradually raised to 180 F., taking six to seven hours to reach that point, the thermometer being suspended on a level with the catgut. The drying process requires great care and should not be done on a rainy day, or in a room containing moisture, such as free steam. The catgut after drying is immediately placed in liquid albolene which has been heated to about the same temperature and allowed to remain over night or about 12 hours. The vessel containing the liquid albolene is lined with thin paper. It is then replaced in the sterilizer, and the temperature slowly raised to 280 F. in four to five hours, and this heat is maintained for one-half hour. The gas is turned off and the catgut allowed to remain in the liquid albolene three hours to cool, or it may be left over night. By grasping the thread with sterile forceps the catgut is lifted out of the oil, the excess being allowed to drip off, the thread is cut, and the coils are dropped into sterile jars, with air-tight glass stoppers, and a solution of iodine in deodorized methyl alcohol poured over, to cover them completely; the strength of iodine varying according to the size of the catgut. For No. 1, 1-500; for No. 2, 1-400; for No. 3, 1-300. The catgut is then ready for use in 24 hours. A bacteriological examination is made of the catgut after sterilization in oil, and again after it has been in the iodine solution 24 hours. A new stock is made at least every three months, as it has been found that the catgut

becomes brittle after remaining longer than that time in the iodine solution. The sterilizer, as shown here, which was designed by Surgeon H. A. Dunn, U. S. Navy, is of copper with brass trimmings, 19 inches high by 14 inches square, and has an inner lining of sheet iron 17 inches deep by 12 inches square; the space between the copper and the sheet-iron lining is filled with sand. A brass bar is screwed across the top to complete this air-tight chamber. The thermometer, which is suspended through the nickel holder, is made adjustable by means of a small piece of rubber fitted into the holder, permitting it to be raised or lowered as required.

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### A SIMPLE METHOD FOR FIXATION OF THE THORAX.

By W. A. BRAMS, Assistant Surgeon, United States Navy.

Fixation of the thorax, thereby limiting the movement of the ribs, is indicated in many instances. Oftentimes it is the only effective means of controlling thoracic pain. The time-honored employment of adhesive-plaster strips serves very well, but the frequent dermatitis and loosening of the plaster strips is a constant source of annoyance in warmer climates.

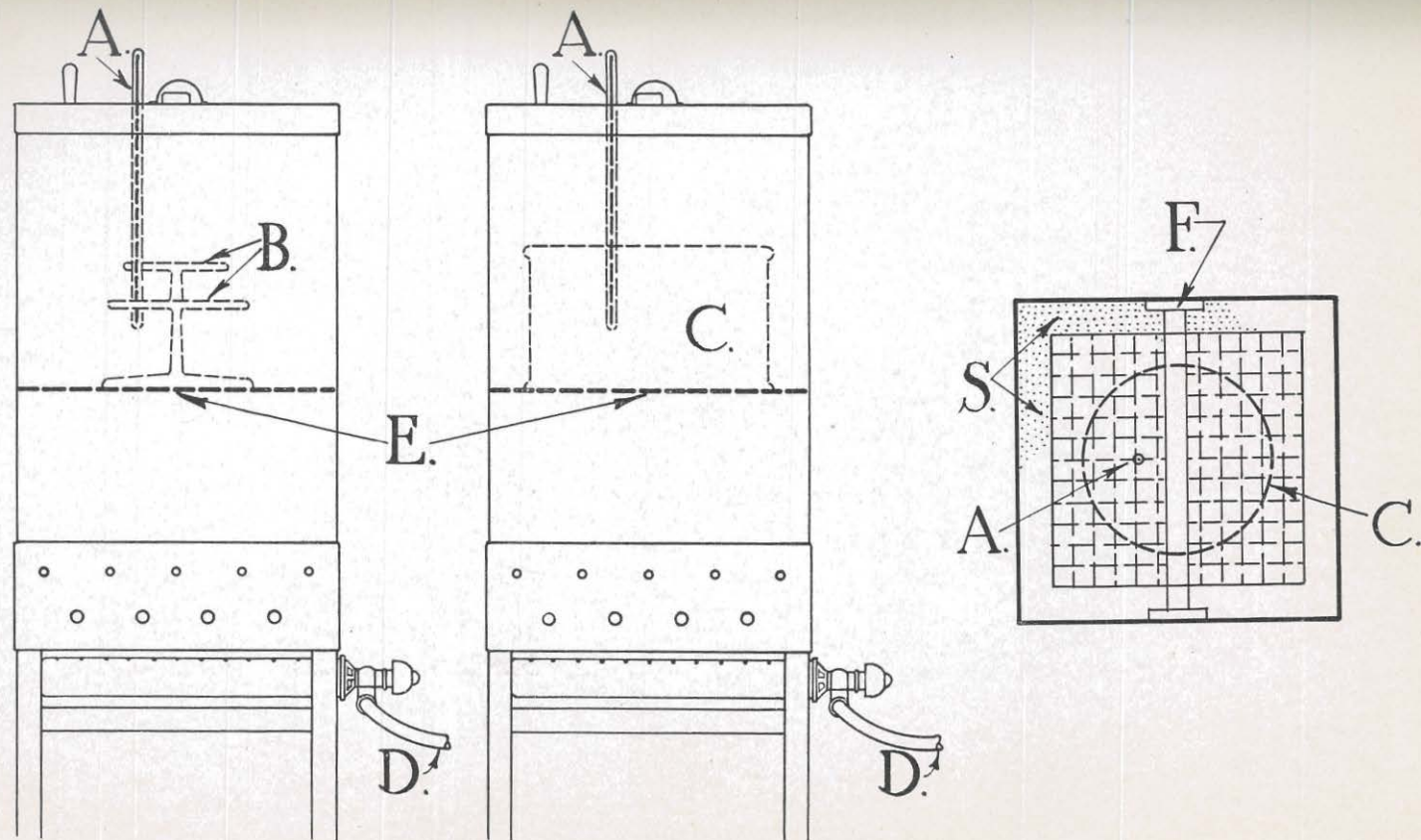
The method here described has all the good features of strapping the thorax with the following additional advantages: It is easily applied and removed, does not irritate the skin, can be adjusted to any chest and with any degree of tightness, is simple and inexpensive, and acts as a splint for the entire circumference of the chest to which it is applied. The value of these advantages will be recognized by those who have used adhesive plaster for strapping of chests in the Tropics.

The appliance consists of a piece of canvas about 30 inches long and about 9 or 10 inches wide. The length should be about 6 inches less than the circumference of the chest. Six eyelets are placed at each end as illustrated in the picture. A pad of gauze is placed under the lacing and eyelets, and the appliance is laced as tightly as may be necessary. No slipping occurs if care is taken when first applied.

It may be loosened or tightened at will, without discomfort to the patient, or it may be removed periodically to permit of an alcohol rub or other local treatment.

The appliance was used with great satisfaction in cases of fractured ribs, pleuritis, and pneumonia. Its comfort and ready adjustment in the latter cases proved a great boon. The simplicity of its construction and the ready application or adjustment are the best recommendations for its use in cases where fixation of the thorax is indicated.

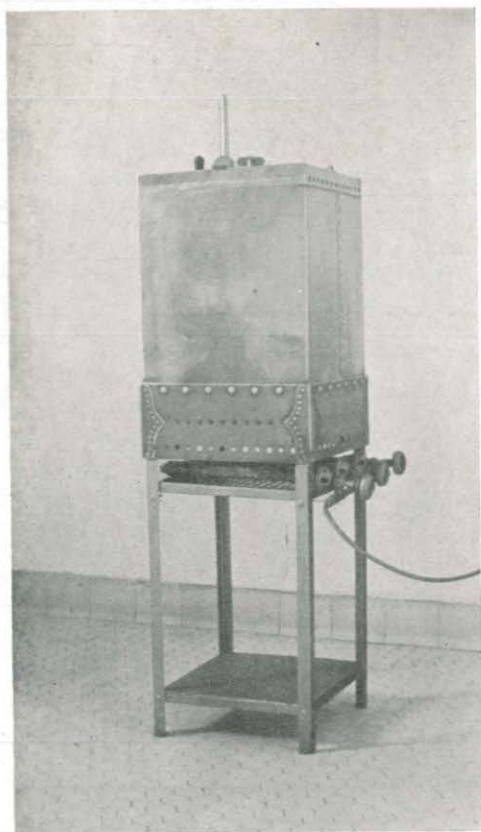




STERILIZER FOR CATGUT.

A, Thermometer; B, frame for drying catgut; C, glass jar containing catgut; D, gas connection; E, removable frame or shelf; F, fastening of top of sterilizer; S, sand filling.

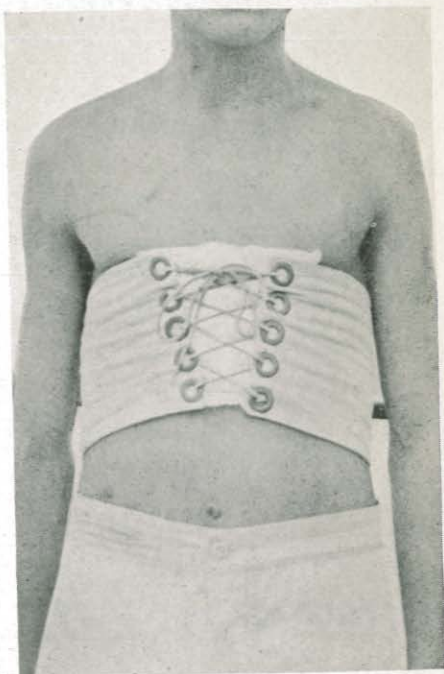
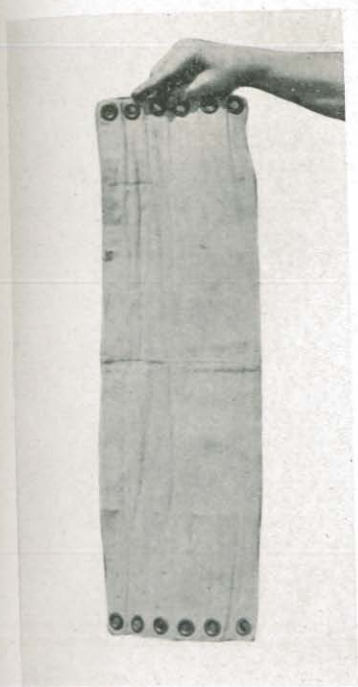
Robinson—Iodized Catgut.



General view of sterilizer for catgut.

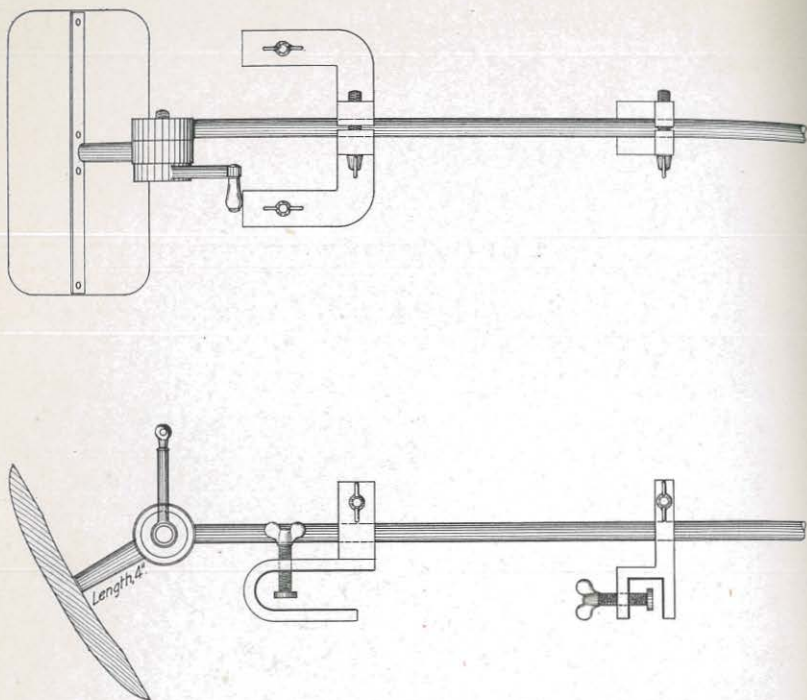
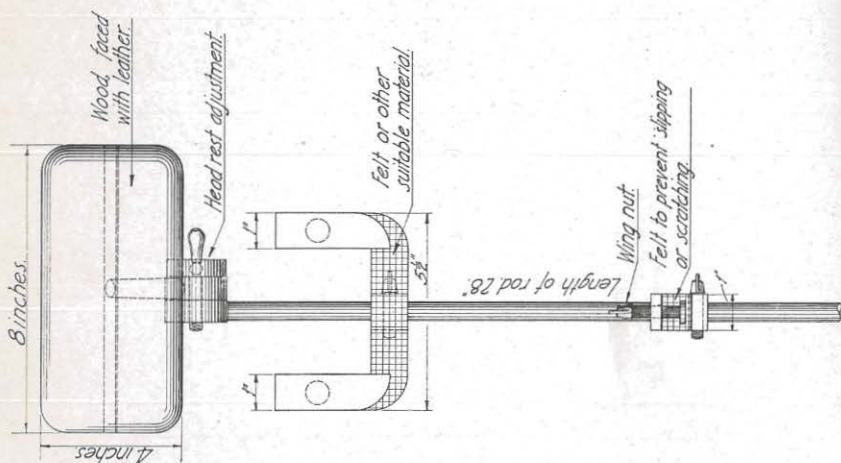


Brams—Fixation of Thorax.



For description see text.

Camera—Adjustable Head Rest.



Front, side, and rear views of head rest.



**AN ADJUSTABLE HEAD REST.**

By C. B. CAMERER, Passed Assistant Surgeon, United States Navy.

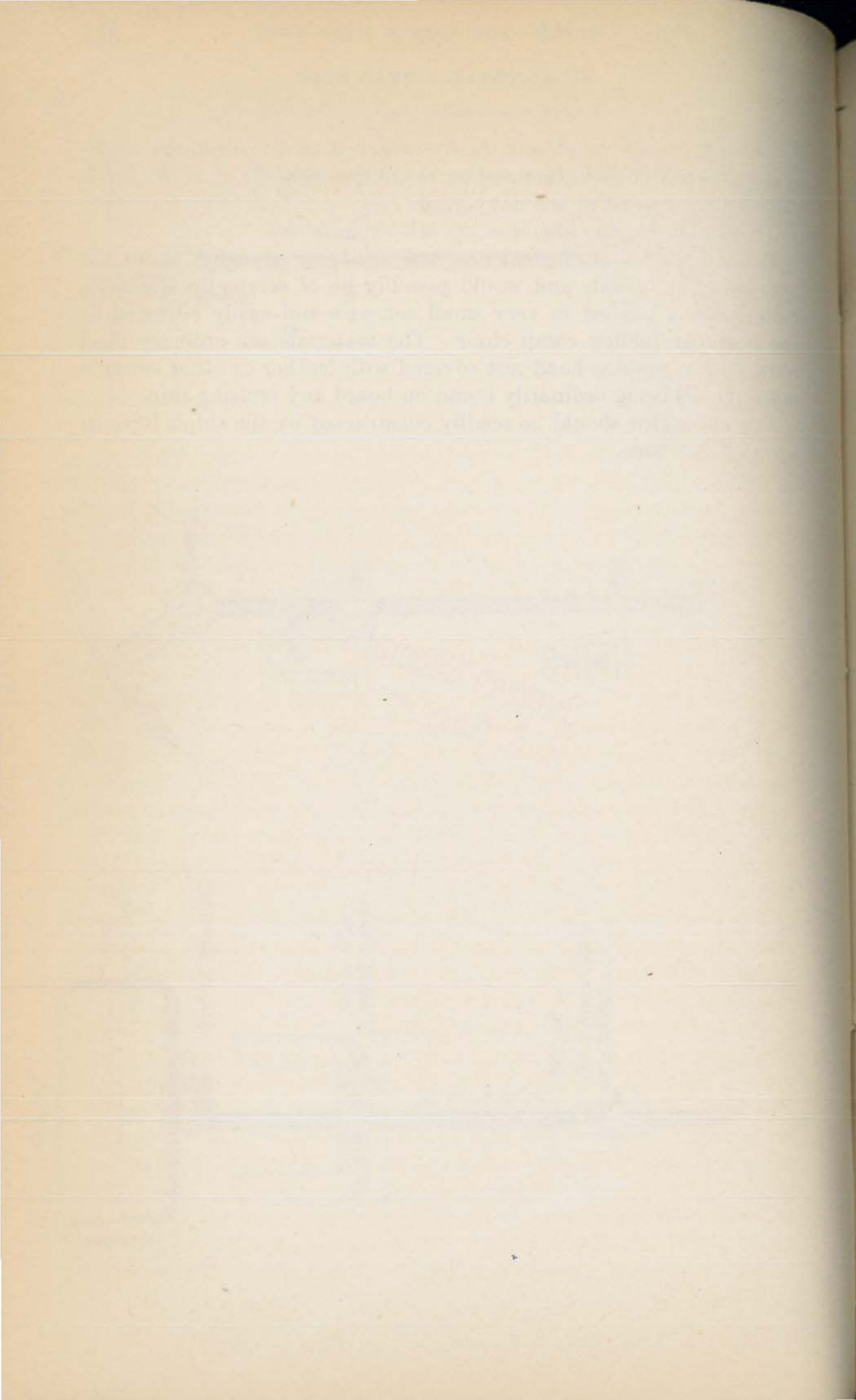
This adjustable head rest, easily attached to any ordinary chair, was devised and manufactured on board this ship (U. S. S. *Buffalo*), only being nickeled at the navy yard.

The accompanying sketches are self-explanatory.

It has been found of great practical utility in any work about the eye, nose, or throat, and would possibly be of service in the field, being readily packed in very small compass and easily adjusted to the ordinary folding camp chair. The materials are ordinary steel rods, with a wooden head rest covered with leather or other suitable material, all being ordinarily found on board any cruising ship.

The apparatus should be readily constructed by the ship's force in a very short time.

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## CLINICAL NOTES.

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### A CASE OF MEGACOLON.

By L. W. JOHNSON, Passed Assistant Surgeon, and C. W. DEPPING, Assistant Surgeon, United States Navy.

Acute intestinal obstruction is not a rare condition in Guam. The round-worm infection is so general that most cases of obstruction in children are presumed to be due to this cause until proved otherwise. During the recent epidemic of whooping cough several cases of obstruction due to intussusception occurred. Unfortunately all of these cases were brought to the hospital too late for successful operative treatment. The patient whose case is here reported was first seen after the condition had persisted for three days, and it then resembled so closely the other cases seen here that the diagnosis of acute intestinal obstruction due to a mass of ascarides was agreed upon.

The patient was a poorly developed, emaciated child, 13 months old. Constipation had continued for a long period and for three days there had been no stool other than a small fluid passage on the day before admission. The abdomen was enormously distended and tympanitic with dullness in the flanks. The skin was shiny and vigorous peristalsis was plainly visible. The distention increased noticeably during the three hours that the child was under observation. Small amounts of a brownish fluid without fecal odor were vomited. An enema brought away a small amount of fecal matter, but no gas.

The diagnosis of obstruction by ascarides was made, and operation advised. It was explained to the relatives that without operation death was certain, while with the operation there was a very slight chance of recovery. Consent was obtained.

Operation was done under chloroform anesthesia, by way of a midline incision above the umbilicus. The colon immediately protruded from the wound; it was distended to about five inches in diameter and the vessels of the colon and mesentery were bloodless, an important factor in the production of gangrene. A portion of the colon was walled off with gauze and punctured with trocar and cannula after a silk pursestring suture had been inserted. About 1,000 mls of liquid feces with a great quantity of gas were evacuated. As soon as the pressure was relieved the vessels at once refilled with blood. An incision was then made in the region of the splenic

flexure and a large amount of feces removed. The condition of the patient became so bad that the incision in the abdominal wall was closed with a through-and-through silkworm-gut suture in a single layer. It was the intention to make an artificial anus at a later operation if the child survived.

Death occurred four hours after operation.

Necropsy: The colon was markedly dilated, but not equally throughout its course; the greatest dilatation was in the region of the sigmoid, where it was about 5 inches in diameter. The entire wall of the colon was increased in thickness and firmer than normal; the increase in thickness was principally in the muscular layer. The mucous membrane was thickened but had no ulcers. No obstruction of any kind was found in the lumen of the bowel and no cause of obstruction could be found outside it. No intestinal parasites were found. The small intestine and appendix appeared normal, as did the other organs.

The bloodless appearance of the bowel wall and mesentery was striking and the return of the blood on the relief of the pressure was equally so. It is evident that gangrene can occur as a result of increase of intra-abdominal pressure, without any other obstruction of the blood supply. The vicious circle is complete; increased pressure leads to ischemia, failure of peristalsis results from faulty blood supply, putrefaction is increased by stasis, pressure is increased by putrefactive gases.

This case should be classed with those instances of congenital megacolon in which the symptoms appear a few months after birth, usually at the time of weaning or of adding solid food to the diet.

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#### THE ACCIDENTAL EXPLOSION OF A 6-POUNDER PROJECTILE WHILE HELD IN THE HAND.

By E. P. HUFF, Passed Assistant Surgeon, United States Navy.

On September 28, 1916, an accident occurred on board the U. S. S. *Scorpion* which was remarkable for the small amount of damage resulting.

While reassembling some 6-pounder fixed ammunition, from which the propelling charge of smokeless powder had been removed, the projectile accidentally exploded while being held in the right hand of the man who was performing this part of the work.

Whether the explosion was due to a defective fuse was not determined, but the method of reassembling employed was no doubt a contributory factor. The method, which was being carried out in the starboard gallery of the main deck, was as follows: The empty case, having been deprived of its powder charge and primer and subsequently washed out with soap and water, was held in the left hand



while the projectile was taken up by the right hand and fitted into the mouth of the case. The projectile was then driven home by tamping the base of the case against a rope mat placed on the deck. Ordinarily from one to eight blows sufficed to seat the projectile, the cartridge being raised through a distance of from 6 to 8 inches from the mat at each blow.

The projectile which exploded was fitted with a Semple tracer fuse and filled with a black-powder bursting charge. It had apparently been about half seated in the case by means of four or five ordinary blows.

H. C. H., seaman, the man employed at the time in the work of reassembling, received the severest injuries. He was sitting on the deck with the mat between his knees and with the projectile supported in his right hand. He was knocked over backward by the force of the explosion, but was only momentarily stunned, as he promptly called for help. The cotton glove which he wore on his right hand was on fire, and its presence no doubt saved him from severer burns about the hand. His face was blackened and slightly powder stained.

Profuse hemorrhage from his right hand was at once apparent, due to the avulsion of the inner half of the hand, including two and a half fingers. The right knee joint was opened by a badly lacerated wound at the inner side of the patella, and there was a perforated wound of the front of the left thigh, below the groin, with considerable subcutaneous emphysema at its outer side. There were also several minor wounds from flying fragments of shell, including one of the right forehead, right shoulder, and right chest, the latter, judging from its contour, having been caused by the detached rotating band.

Numerous fragments of shell were later picked up about the deck, and several were found firmly embedded in the steel bulwarks and in the wooden deck house, but only one man was at all seriously injured by these.

L. S. R., fireman, first class, who was passing about 6 feet from the scene of the accident, received a perforated wound of the right calf muscles and a superficial abrasion of the right ankle. H. A. B., oiler, received several small abrasions of the face and exposed parts of the hands and arms, and M. M., oiler, suffered a slight contusion of the inner surface of the left ankle.

H. C. H. and L. S. R., the former suffering from marked shock, were at once transferred to a civilian hospital on shore, where their wounds were redressed and they were given prophylactic doses of tetanus antitoxin. With the exception of a slight nerve involvement, the wound in the leg of L. S. R. healed uneventfully, and he has now returned to duty (Nov. 20). The wound in the knee of H. C. H. fortunately closed with very little infection, and the functional result is



very good. However, his hand became badly infected, and for several days he was delirious with fever, which rose to 40 C. by axilla. At the present time (Nov. 22) his general condition is excellent and the wound of the hand is rapidly closing in. The stump of the second finger is apparently useless, and it will probably be advisable to remove it later by a plastic operation. The function of the thumb and index finger is slowly returning, but as yet they can not be apposed. It is hoped, however, that this man may eventually be able to hold a pen in his injured hand and that the duties of a yeoman will not be beyond his ability.

Ordinarily it is supposed that a shell of this type will upon exploding break up into a large number of fragments and that it will have a destructive action over a radius of many feet. In this case, however, the fragments were quite large and few in number, but considering the fact that they were uninfluenced by shell velocity, and were therefore spread in all directions, it is very remarkable that more of the numerous men working in the immediate vicinity were not injured and that the few wounds received were not more serious.

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#### A CASE OF BICHLORID OF MERCURY POISONING, WITH SUICIDAL INTENT.

By F. W. F. WIEBER, Medical Director, United States Navy.

X—, yeoman, second class, was admitted into the naval hospital, Portsmouth, N. H., at 1.45 a. m., June 18, 1916, with the history of having crumbled and swallowed three bichlorid tablets (7.7 grains each) about three hours before. This he admitted, and the facts were substantiated by an eyewitness.

The patient was on liberty at the time and received his first treatment by a civilian physician. This consisted of stomach irrigation and the administration of the whites of three eggs, mixed with flour and milk, soon afterward. He vomited shortly after this, the vomitus containing bloody mucus, but no pieces of the tablets were seen.

When he arrived at the hospital, two and three-quarters hours after taking the mercury, he was slightly drowsy, restless, and complained of some abdominal pain. There was rather severe rectal tenesmus with frequent small stools which consisted of coagulated egg albumen, mucus, and a small amount of blood. Tested for mercury, they were strongly positive. The stomach was immediately washed out on arrival, the washings containing blood-stained mucus. They were faintly positive for mercury.

At this time the urine also contained a trace of mercury, but was negative for albumin.

He was given castor oil, 2 ounces, and placed between blankets. Hot-water bags were applied. Potassium acetate, 30 grains, and sucrose, 1 dram, in 8 ounces of water, every hour, was given, also



proctoclysis (240 grains potassium acetate to a quart of water), which was continued throughout the night.

A few hours after admission the bloody stools increased in number, and the quantity of urine decreased. The latter showed large amounts of albumin (50 per cent by volume). It was now markedly positive for mercury and contained large amounts of granular débris and numerous granular and epithelial casts, red blood cells, leukocytes, and renal epithelium.

Hot packs were begun at about 6 a. m. the first day, and albumen water (white of one egg in four ounces of water) was given every two hours, alternating with the following: Sodium acetate (substituted for potassium acetate) 30 grains, sucrose, increased to one-half ounce, in 8 ounces of water every two hours. Sodium acetate was also substituted for potassium acetate in the solution used by rectum.<sup>1</sup>

During the second night the stools became more frequent, small, bloody, and accompanied by increased tenesmus. At this time the patient stopped voiding urine and required catheterization for the next two weeks. At no time, however, was there complete suppression. The hot packs were continued for about 10 days, during which time the amount of urine was from 200 to 300 mils daily, and analysis showed the composition to remain practically as follows: Total solids, 9 grams; urea, 0.8 gram; chlorid, 0.3 gram; albumin, 3.5 grams per liter. Mercury was present in large amounts during the first 36 hours; later, only in traces. On the second day the test for acetone was slightly positive; on the third, acetone was present in large amounts, but diacetic acid was negative. At this time the total ammonia was 2.5 grams, but in three days it had decreased to about normal (0.9 gram).

The sodium acetate mixture, albumen water, and proctoclysis (used as much as frequent bowel movements would permit) were gradually reduced after the test for mercury in the urine became negative (June 23), and by the twelfth day of illness all had been discontinued.

During the first week the patient's mental dullness and restlessness remained about the same. The bowel movements increased in number until they were from 12 to 20 daily, and contained blood and mucus. The amount of urine was 200 to 300 mils. His condition changed little during this time.

By the end of the second week (July 1) the urine had increased to about 2,000 mils, and continued to show albumin, 0.75 gram per liter, acetone, low urea, and casts. The amount of pus had gradually increased so that at this time between 3 and 4 drams would settle from the 24-hour specimen. It was thought that, possibly, a large

<sup>1</sup> New York Med. Jour., June 10, 1916, p. 1136.



amount of this might be due to a cystitis resulting from the necessary catheterization, but repeated examinations proved it to be of renal origin. This large amount continued for two weeks, after which it gradually lessened, so that only a few pus cells were present during the fourth week. The small, bloody, bowel movements, some of which were involuntary, continued (15 to 20 daily), but his general condition was improving slowly, there being less mental dullness, less restlessness, and less insomnia. Milk diet, begun on tenth day, continued.

During the third week (July 2 to 9) the dysenteric movements decreased and stools were normal by the end of that period, and his general condition was steadily improving, but the quantity of urine continued to increase until he was voiding about 3,500 mls daily (sp. gr. 1.010–1.018), and drinking large quantities of milk and water. At the end of the third week soft diet was begun and increased gradually.

During the fourth week (July 9 to 16) the polyuria and polydipsia increased, the former becoming as high as 4,915 mls (sp. gr. 1.010–1.015), and at times he consumed as much as 8 or 9 pints of fluid daily. The urine began to show less albumin, and *very few casts and pus cells*. The patient's appetite was good, and he was improving rapidly. He was encouraged to take less fluid, and the output of urine steadily decreased.

By August 1 the patient had almost recovered; the 24-hour urine was normal in amount, showing neither albumin nor casts, and but few pus and epithelial cells.

The urine during the last two weeks having been normal in quantity, with only a very slight sediment, negative for pus cells, casts, or renal epithelium, he was discharged to duty on August 30, having completely recovered.

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#### GONORRHEAL PROCTITIS—A REPORT OF TWO CASES.

By W. W. CRESS, Assistant Surgeon, United States Navy.

Gonococcus infection of the rectum, or gonorrheal proctitis, receives little attention from most writers upon the subject. In fact, most authors dismiss the subject with the statement that it is a rare condition, and when it does occur is infrequently diagnosed.

Drueck<sup>1</sup> states that it is a rare condition and that it is more frequent in women on account of the close proximity of the vulva and rectum. On the other hand, other writers, notably Lynch,<sup>2</sup> state that the disease is rarely found in women suffering from gonor-

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<sup>1</sup> Drueck, C. J. Proctitis. Med. Rec., New York, xc, No. 9, Aug. 26, 1916.

<sup>2</sup> Lynch, J. M. Diseases of the Rectum and Colon.



rheal vaginitis, even though the discharge is profuse. This same author states that gonorrheal proctitis, while not very common, is seen very frequently in the large clinics devoted to this specialty, and that a great many cases of proctitis are of gonorrheal origin but, when seen in the later stage, the organism can not be found.

The writer is of the opinion that the gonococcus is a rather common cause of proctitis and should be looked for in every case of purulent discharge from the rectum. The following two cases came under the writer's observation within a period of 10 months.

*Case 1.*—A young man, aged 22, applied for treatment for the relief of a burning pain in rectum. He stated that he felt as though his "lower bowels were on fire." He refused examination. A few hours later he returned with the statement that the pain had become unbearable. An examination revealed the presence of a thick yellowish discharge from the rectum. Stained smears showed many Gram-negative diplococci. The patient denied ever having had a discharge from the urethra. Examination of the penis failed to reveal any evidence of a venereal infection. Further questioning elicited the information that the patient was a sexual pervert and a sodomist. After a few days' treatment the purulent discharge disappeared, to be followed by a thin serous exudate which persisted for weeks. There were no Gram-negative diplococci found in the discharge after the first week of the disease.

This infection was undoubtedly a result of the patient's unnatural practices. Probably a large percentage of the infections are contracted in this manner. Cases of chronic proctitis are not uncommon among inmates of penal institutions.

*Case 2.*—Female, single, applied for treatment complaining of (1) itching and burning in region of anus, (2) diarrhea, (3) cramp-like pains in lower abdomen, (4) discharge of blood-stained pus from rectum. Physical examination: Temperature, 101°; pulse, 94; appearance rather anemic and toxic; patient apparently quite ill. Abdomen showed an area of tenderness upon deep pressure over left lower quadrant. Examination of rectum revealed the presence of protruding hemorrhoids and a mucopurulent discharge. Smears from this discharge showed many Gram-negative diplococci. The findings were explained to the patient. She denied all history of venereal disease but consented to further examination. Smears from the urethra showed a few Gram-negative diplococci.

In view of the symptoms and physical findings in this case, I am of the opinion that the infection involved the sigmoid colon and perhaps a portion of the descending colon. A case in which the entire colon was involved has been reported by J. Rawson Pennington.





# PROGRESS IN MEDICAL SCIENCES.

## GENERAL MEDICINE.

E. THOMPSON and J. A. RANDALL, Surgeons, United States Navy.

STILLMAN, E. G. **Epidemiology of lobar pneumonia.** Jour. Exper. Med., December, 1916.

The author states as follows:

"Dochez and Avery have reported observations which suggest that in a majority of instances of lobar pneumonia, the infection is acquired by transmission of the infectious agent from a recovered case which still harbors in the mouth secretions the organism responsible for the disease, or from a healthy carrier of pathogenic pneumococci. The validity of this assumption depends upon the following factors: Lobar pneumonia in 65 per cent of cases is due to specific types of pneumococci possessed of high pathogenicity, which do not occur in the buccal secretions of normal individuals, except in instances where there has been intimate association with persons suffering from the disease. Although pneumococci are present in the mouths of 60 per cent of normal individuals, the organisms present are readily distinguishable from the highly parasitic types of pneumococcus which cause the severe forms of lobar pneumonia. The organisms found in normal mouths, moreover, occasion but a relatively small percentage of the total cases of this disease.

"In the present paper are reported the facts obtained during an investigation, which included, first, a study of the varieties of pneumococci concerned in the production of cases of lobar pneumonia admitted to the hospital of the Rockefeller Institute during the past four years; second, a study of the varieties of pneumococci in the mouths of normal individuals; third, the frequency of occurrence of disease-producing types of pneumococci in the mouths of normal individuals; fourth, the frequency of the occurrence of disease-producing types of pneumococci in the mouth secretions of healthy persons associated with cases of lobar pneumonia; and fifth, a study to determine the period of time during which convalescents harbor in the mouth the types of pneumococci responsible for the disease."

The author's summary is as follows:

"(1) Pneumococci of type 1 and type 2 are responsible for the majority of the cases of lobar pneumonia.

"(2) Among the pneumococci found in the mouths of healthy individuals, type 4 predominates, type 3 is fairly frequent, and

atypical organisms of type 2 are occasionally encountered. Organisms of these types give rise to a minority of cases of lobar pneumonia.

"(3) Healthy persons intimately associated with cases of lobar pneumonia may harbor in their mouth secretions the highly parasitic pneumococci of types 1 and 2.

"(4) Occasionally a carrier of type 1 or type 2 pneumococcus is encountered in whom it is impossible to trace any contact with an infected patient.

"(5) Convalescents from lobar pneumonia may carry for a considerable period of time the type of pneumococcus with which they were infected."—(R. H. LANING.)

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NATALE, E. Local serumtherapy in suppurative serous sacs. *Ann. di Med. Nav.* e *Col.*, May-June, 1916.

Dr. Natale reports several cases of purulent infections of pleural and peritoneal cavities cured by the local injections of antistreptococcic serum. He calls attention to the fact that in purulent effusions of closed serous cavities as the pleura and peritoneum, the local introduction of a specific antistreptococcic serum will in a brief period of time completely cure cases which had resisted the hypodermic use of the same serum for long periods of time; even in old-standing cases where a marked cachexia is present.

He reports cases of pleuritic effusions with profound cachexia which had resisted treatment for months but were rapidly cured by the injection of antistreptococcic serum directly into the affected pleura, as follows: 20 mils the first day and 10 mils on each of the succeeding two days.

The first injection of 20 mils of serum was followed in 24 hours by the transformation of a thick, dark pus into a thin, scanty discharge; 24 hours after the second injection of 10 mils of the serum the discharge became entirely serous, only a few streptococci being observed on a bacteriological examination. Following the third injection of 10 mils of serum, the secretion became very scanty and serohematic in nature. The cicatrization of the fistula followed quickly without need of further treatment.

The author points out that the hypodermic injections of serum could only affect the local infection through the small amount of diluted serum that could reach the seat of trouble through the circulation, and therefore the amount of serum in the circulation would have to be enormous in order to effect the same result as 5 mils of the same serum injected locally; and in cases of old empyemas, the antistreptococcic serum in the blood could not easily cause the formation of specific agglutinins and bacteriolysins, nor raise the opsonic index.



On the other hand, while the ordinary antiseptics used locally destroy or paralyze bacteria, they must be used cautiously enough to prevent any injury to the tissues or absorption and consequent toxic results; therefore, there will always be recesses in the walls of the pleura where groups of bacteria are not reached by the antiseptic, and so keep up the infection. The author believes that the specific serum used locally is the ideal antiseptic in such cases, because with its agglutinins and bacteriolysins it paralyzes or destroys the bacteria and does not produce any injury to fixed cells. Neither has one to fear any phenomena of anaphylaxis, because this never occurs in a continuous treatment, and the absorption of the serum is very slow owing to the inflammatory bases of the cavity in question.—(J. A. BIELLO.)

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TANGANELLI, E. Report of 75 cases of scabies cured with Ehlers' method. *Ann. di Med. Nav. e Col.*, May-June, 1916.

Dr. Tanganelli reports 75 cases of scabies treated with the method proposed by the Danish dermatologist Ehlers, a method of great practical value, easy of application, rapid, and innocuous. The treatment consists in the application of an ointment the preparation of which as described by Ehlers is as follows:

Potassium hydrate..... gm. 125.

Dissolve in water..... mls 125.

Add immediately commercial sulphur..... gm. 125, and shake thoroughly.

Filter the above, the filtrate being a clear orange-yellow liquid of almost pure pentasulphid of potash.

Next take vaseline and lanolin, each gm. 225, thoroughly mix into a homogeneous mass, and add to the above solution, thus obtaining a soft paste.

Now add to this paste zinc hydroxid, which is obtained by uniting—

Sodium hydrate..... gm. 8	} with {	Zinc sulphate..... gm. 20
Dissolved in water..... mls 10		Dissolved in water..... mls 30

Finally add liquid paraffin, or vaseline and lanolin *q. s. ad* gm. 1,000.

The treatment is as follows:

First. Cleansing bath, using plain soap (not green soap).

Second. Rub the ointment thoroughly over entire body for about half hour (do not use brush).

Third. Powder skin with either talcum or starch.

Fourth. After 24 hours give another cleansing bath, followed by clean linen.

In the 75 cases treated by the author the following facts were observed:

(a) In two-thirds of the cases, the pruritus ceased immediately after the treatment and the skin returned rapidly to normal.

(b) In the remaining third, there was a moderate pruritus for a few days in the regions of the axillæ, scrotum, and pubes; this pruritus, however, was suspected to be due to an increased sensibility and irritability of the parts involved, and not to a persistence of the disease, this being proved by the fact that the symptoms disappeared without the necessity of repeating the treatment.

(c) In all the cases, without exception, the treatment did not cause any cutaneous lesions, nor any general disturbances of any sort.

The only objection to the treatment is a slight odor of hydrogen sulphid which develops during the friction when applying the ointment, but has never caused any inconvenience.

The author states that even in long standing cases, and in cases complicated by excoriations, papules, pustules, furuncles, eczema, etc., the above treatment not only cured the scabies, but contributed largely to the rapid cure of the complicating conditions.

The author gives several illustrations of complicated cases which were completely cured and discharged to duty in less than a week's time.

Of the 75 cases reported, there were two recurrences after 15 and 30 days, respectively. The author attributes them to a faulty technic in applying the treatment, and not to failure of the treatment itself, and suggests therefore that in cases in which there is doubt as to the accuracy of the technic, a repetition of the application be made at once rather than risk a recurrence.

The main advantages of the treatment are: Efficiency and rapidity of the cure, facility of application, and absence of chemical or mechanical irritation; which makes it applicable to all cases including complicated ones.—(J. A. BIELLO.)

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KNOWLES, F. C. Eczema of external origin and its relationship to dermatitis. *Jour. Am. Med. Assn.*, lxxviii, No. 2, p. 79.

As a result of studies of 36,996 dermatologic cases of which 6,453 were classed as eczema, the writer reaches the following conclusions:

Almost one-third of all cases of eczema are of definite external origin. About one-sixth of all cases of this affection are caused by the occupation of the individual.

Microorganisms play only a secondary rôle in the causation of the disease.

Practically every occupation and every irritant may produce an eczema.

The portions of the skin exposed to the irritant determine the site of the outbreak.

The eruption not infrequently extends beyond the irritated areas, at times being observed on distant parts of the cutaneous surface and also generally in certain instances.



The usual type of eruption noted is the vesicular or the erythematous squamous.

The eruptions mentioned as occurring in the cases in this article have lasted for weeks, months, and years, and showed a marked tendency to relapse.

It is rather hard to explain the susceptibility of some persons to certain irritants, while others are not affected, excepting on the theory of a pure idiosyncrasy, an anaphylactic tendency causing sensitization of the skin.

As dermatitis and eczema of external origin have the same clinical and microscopic appearances, they should be classed under the heading of dermatitis.—(W. E. EATON.)

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HEIMANN, W. J. The pathology and pathogenesis of eczema and dermatitis. Jour. Am. Med. Assn., lxxviii, No. 2, p. 75.

Eczema and simple dermatitis resemble each other clinically and microscopically. Thus eczema, from the standpoint of pathology, is dermatitis, differing from the latter in the clinical sense only in so far as it arises without a demonstrable local cause. For the rest, both are dependent on a predisposition which renders the patient susceptible or responsive to the influence of the determining factor. A great number of conditions, both general and local, constitute defects which augment susceptibility, while an equally formidable array of known precipitating agents has been compiled, their number steadily increasing at the cost of a diminishing body of unknown ones. The distinction between eczema, since it is dermatitis, and what is frankly regarded as dermatitis, is purely academic and is based solely on human limitations. Processes which are alike clinically, histologically, histogenetically, and pathogenically, are identical; wherefore, all that remains of eczema is the fact that it is dermatitis of unknown origin.

This being the case, it is scientifically disadvantageous to continue the use of the term. The whole class of conditions in question should be divided into two groups; dermatitis of known and unknown origin, respectively, of which the second would represent the ancient eczemas. But as such a change would throw a heavy tax on loyalty to tradition and on dermatologic literature, the continuance of the classic term may be allowed with the restriction that it indicates dermatitis, the immediate cause of which remains obscure. Eczema would thus cease to be accounted a disease *sui generis*, and would be looked on as an index of morbidity, the determination of which would become a duty. In other words, since its rational treatment would depend on a knowledge of its cause, it would stimulate the study of the dermatosis from the standpoint of internal medicine. This



would be of benefit to the patient and would hold dermatology to a scientific path from which it tends only too often to be lured by the fascination of glittering, if somewhat unsound, morphologic superficialities.—(W. E. EATON.)

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STROUSE, S. **Renal glycosuria.** Med. Clin. of Chicago, September, 1916.

The mere presence of a reducing substance in the urine is never a sufficient basis for diagnosing diabetes. The reducing substance must first of all be identified as dextrose by the usual chemical means at the disposal of any clinical laboratory, and even then further steps should be taken to clinch the diagnosis. The determination of blood-sugar can easily be done to-day and should be performed in every case of glycosuria. Furthermore, the clinical history, development of the symptoms—thirst, increased appetite, increased urination, the relation between intake and excretion of sugar—and the course of the disease must all be carefully observed before labeling a glycosuria as diabetes, and until we use every possible means of making a diagnosis, and are thereby sure that the reducing body means diabetes, we must be cautious in discussing prognosis and treatment. Although glycosuria is presumptive evidence that the case is diabetes, it is not any more positive proof than a continued fever is positive proof of a typhoid infection. Treatment of a case of renal glycosuria as diabetes would be bound with unnecessary difficulties for the physician and unnecessary hardships for the patient, and an unwarranted gloomy prognosis would have to be given.—(W. S. PUGH.)

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BROWN, M. A., and GRAHAM, M. P. **The Sippy treatment of gastric and duodenal ulcer, with report of case.** Lancet-Clinic, September 2, 1916.

Briefly stated, Sippy's treatment is a "medical cure by an efficient removal of gastric juice corrosion." Medical cures we have had in the past in plenty, some of them, as those of Lenharz and Luebe and the various modifications thereof, fairly satisfactory in their outcome; and all of them, however, open to the serious objection that no attempt has been made to determine what effect if any the treatment instituted was actually accomplishing.

For two generations the theory of malnutrition or necrosis of a small area in the wall of the stomach or duodenum with subsequent digestion of the necrotic part has been advocated as the important factor in the causation of ulcers, while recently the researches of Rosenow have proven beyond reasonable doubt that streptococcic infection is the usual cause of the local necrosis. It is interesting to know that Bottcher and Letelle, as early as 1874, attributed the



causation of ulcer to bacteria, which they claim to have demonstrated in colonies in the base and in the surroundings of the ulcer.

Equally prevalent is the belief that peptic ulcer would show the same tendency to heal as benign ulcer in any part of the body, in an otherwise healthy individual, were it not that the process of healing is interfered with by the digestive action of the gastric juice. The most important factor in this respect is the free hydrochloric acid, for without its presence the digestive action of the pepsin on the ulcer is practically *nil*. The peptic action is not exerted to any appreciable extent in a neutral or alkaline medium, nor are combined acids able properly to prepare the albuminous portions of the food for the action of the pepsin.

The treatment is based largely upon the above mentioned principles. The ulcer is given a chance to heal by the neutralizing of the free acid, by means of alkalis and by frequent feedings of soft nonirritating albuminous foods. In other words, in order to secure satisfactory results, the ulcer must be guarded continuously against the corrosive action of a gastric juice. Frequent aspirations and examinations of the stomach contents are made, to watch the effect of treatment; and the amount of alkalis is increased or diminished as occasion warrants. The alkalis advocated are sodium bicarbonate and heavy calcined magnesia, preferably the latter, on account of its greater alkalinity. Magnesium oxid can seldom be used exclusively in any one case, however, because in doses sufficient to control the acidity, it will usually cause a troublesome diarrhea. This consequent ailment may be obviated to some extent by several large doses of bismuth given at intervals during the day.

The case reported is one giving the usual symptoms of ulcer. The essential point in the treatment is that the alkali must be given at frequent intervals to entirely correct the acidity. Large doses were required and as much as 50 grains of sodium bicarbonate were given each hour, and 20 grains of magnesium every two hours. The treatment is controlled by frequent small feedings and aspirations of the stomach contents for examination.—(E. T.)

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STONE, H. B. A treatment for pruritus ani. Bull. Johns Hopkins Hosp., August, 1916.

While pruritus ani is merely a symptom, yet it is of such importance and causes so much annoyance and distress that it demands treatment without regard to the cause, which in a number of the worst cases can not be discovered. Like all obscure diseases and symptoms, the theories and treatment are legion.

This paper is a preliminary report on the treatment of pruritus with injections of alcohol. The success of alcohol injections for



producing localized lasting anesthesia in facial and other forms of neuralgia, suggested the application of the same principle to the abolition of unpleasant sensations from the anal and perianal regions. The alcohol, of course, produces its effect by destruction of the nerve fibers with which it comes in contact. The alcohol method presents certain definite advantages that will be referred to later; there are certain possible disadvantages, also, that will be considered at once. Since there is no selective action of alcohol by which motor nerves are spared and only sensory ones are injured, one might expect a loss of sphincter control, if the injection were allowed to come in close contact with the motor branches to the muscles. Moreover, an injection of a substance causing tissue destruction, if too superficially placed, might be expected to cause a slough and resultant ulceration.

Animal experiments were first carried out. It was found that alcohol did produce complete anesthesia, and if the injections were made deeply on the motor nerves a sphincter paralysis was caused. It is quite possible, however, and not very difficult to produce anesthesia without sphincter paralysis or skin ulceration; this effect is brought about by introducing the needle entirely through the skin, but injecting the alcohol immediately under the skin and never more deeply.

During the past two years the author has treated seventeen cases of pruritus ani. In his words the results are as follows: There is some soreness during the first 24 hours, after which the only subjective sensation remarked is numbness. The itching is immediately abolished and the area injected is largely or completely anesthetic. No case so far has shown the slightest evidence of disturbance in the action of the sphincter. There are several cases in which small superficial sloughs resulted, but these all healed promptly and without difficulty. They were due to faulty technic in placing the alcohol too superficially, a fault due to the careful avoidance of too deep an injection and to the fact that the folded, irregular surface of the skin about the anus renders it much more difficult to keep the injections at a uniform depth than would be the case were the surface level. How long the freedom from itching will last is not known.

One patient has returned for a second injection, eight months after the first, for a recurrence of itching. All of the patients seemed much gratified with the results obtained, so far as we were able to follow them. An interesting change is to be noted in the physical appearance of the skin after a patient has received this treatment. The skin in typical cases of severe pruritus is thrown into thickened folds and ridges; it looks edematous and grayish-white, with red scratch marks and superficial fissures radiating from the anus, and feels stiff and indurated. A few days after an alcohol injection the



folds become less pronounced and rugged; the color becomes more that of normal "flesh color," and the scratch marks disappear. In short, there is a return to the normal appearance of the skin in this region.

The injections must be given under general or local anesthesia. In most of the cases the anesthesia was local. The alcohol is injected with a fine needle. The strength of the alcohol is 95 per cent. The needle is carried entirely through the skin vertically and then is inclined sharply to the side, so that it lies nearly parallel to the skin surface. When the needle is properly inserted in the subcutaneous fat it can be moved fairly freely from side to side under the skin and can be felt moving with the finger placed over it. If this freedom of movement is lacking, the needle is probably engaged in the corium, and if injections are thus made sloughs may be expected to result. With the needle properly placed the whole area involved is injected, enough alcohol being used to underlay the area thoroughly.—(E. T.)

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BRONSTEIN, B. *Acute syphilitic meningitis.* Internat. Clin., December, 1916.

Bronstein considers that the term acute syphilitic meningitis should be more particularly applied to acute meningeal phenomena of the secondary period, sometimes preceding but more frequently accompanying the cutaneous manifestations of this period. The pathology is essentially a meningovascularitis with hypersecretion of the cerebrospinal fluid. Prodromal symptoms, such as headache and insomnia, may or may not occur. Acute syphilitic meningitis at its height, as Bronstein says, presents the clinical picture of the tubercular form, differing from the latter by the indistinctness of the symptoms, such as contractures and stiffness of the neck, and by the absence of any marked disturbance of the pulse and respiration. In the luetic form fever is apt to be absent and there may be remissions and relapses. Lumbar puncture reveals a considerable hypertension of the cerebrospinal fluid, albumin in quantity, and a marked lymphocytosis with plasmozellen. The cerebrospinal fluid may yield a positive Wassermann even when the blood serum is negative. Other manifestations of syphilis are to be looked for. The immediate prognosis is rarely fatal, but the ultimate prognosis should be reserved. Prophylactic treatment is recommended whenever the cerebrospinal fluid shows a lymphocytosis, even when all meningeal symptoms are wanting. The treatment consists in frequently repeated removal of the cerebrospinal fluid in considerable amount, combined with intravenous injection of cyanid of mercury and intraspinal injections of colloidal mercury. Neosalvarsan or salvarsan have a much more rapid action, but must be prudently handled in neurologic lesions of syphilis.—(R. C. R.)



LITCHY, J. A. A clinical consideration of migraine. *Internat. Clin.*, December, 1916.

Migraine is considered by the author as the most frequent headache, occurring in 700 of his 15,000 patients sick from all causes. He believes that the so-called acidosis in children may often be a forerunner of a well-established sick-headache habit. The interesting relation between migraine and epilepsy deserves further study. Among the author's 15,000 patients epilepsy occurred in 7, and both migraine and epilepsy in 70. Auerbach's theory, which attributes migraine to an actual disproportion between skull capacity and volume of brain, needs further proof. Litchy shows that the diagnosis is easy when there are headaches which are unilateral, periodical, and hereditary, but when only one or two of these symptoms are present, or when there is only a periodicity of some of the minor symptoms or possibly of the auras, the diagnosis may be difficult. Migraine is frequently mistaken for pelvic disease, for acidosis or cyclical vomiting in children, and organic disease, when some of the auras are present. The psychasthenic and the gastric symptoms frequently lead to confusion in diagnosis. While the underlying causes of migraine are vague and furnish little light as to treatment, much can be done to ameliorate the symptoms by proper handling of the exciting causes that aggravate the patient's general condition and precipitate the attacks. Most thorough investigation and careful individualization are indicated. Systematic administration of the bromid salts and avoidance of undue fatigue are especially recommended.—(R. C. R.)

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FOOTE, J. Chronic duodenal indigestion in children. *Internat. Clin.*, December, 1916.

This condition is said to occur most frequently in children after the first year, and especially in those who have suffered from dietetic errors, usually with antecedent contagious diseases, or from prolonged intestinal infections. This form of indigestion seems to be accompanied by deficiency of pancreatic ferments, especially lipase. A mild duodenitis, which either passes up the pancreatic duct, or diminished hormone formation, seems responsible for the condition. Diminished bile production may also be a factor. Anemia, loss of weight, and mental underdevelopment occur. Large pendulous abdomen is common. Bottle feeding has been employed. Fever may be encountered, vomiting almost never. The number of daily stools varies from 3 to 12. They are thin, contain some mucus and flakes of whitish material and have a very foul odor. They give an acid reaction and microscopically contain not only large quantities of fat soaps, but also a considerable amount of neutral fat but rarely starch granules. It is to be differentiated from mesenteric tuberculosis and acute duodenal indigestion. The treatment consists in reducing the food elements which have proven indigestible,



namely, the fat, and stimulating enzyme production by the administration of hydrochloric acid and pancreatic ferments.—(R. C. R.)

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### MENTAL AND NERVOUS DISEASES.

R. SHEEHAN, Passed Assistant Surgeon, United States Navy.

LUMSDEN, T. The psychology of malingering and functional neuroses in peace and war. *Lancet*, London, November 18, 1916.

Appreciating the fact that the diagnosis and subsequent treatment of hysteria, neurasthenia, and malingering is made difficult by the merging of symptoms common to any two or all three of the conditions, the author cites illustrative cases giving the psychology of each in an attempt to clear the atmosphere. Hysteria is more a lack of will to do right than a will to do wrong, the highest centers cease to control the lower subconscious centers, inhibition gives way, and abnormal manifestations appear. "All of my experiences of hysteria lead me irresistibly to the conclusion that the disease is nothing but the vicarious expression of unsatisfied desire, usually of a sexual nature." Civilization and popular morality deny such desires and many other motives, their natural outlet, yet the motives are so powerful that some discharge of all the potential energy they represent must take place and hysterical symptoms are the result. In hysteria a cure may only be expected when an outlet is attained through a natural means—marriage—or by some form of physical work to dispel the accumulated energy. The author states that development of neurasthenia in an individual depends upon whether the amount of surplus nerve force stored up is sufficient to weather the storm. If the demand for nerve energy is greater than the income the break is sure to come in the end, provided the causative factors are persistent enough. Therefore a cure for neurasthenia should be sought by eating sufficient food, digesting it properly, and secondly by diminishing our expenditure of nerve energy by sleeping sufficiently and avoiding worry. The cardinal symptoms as cited are irritability, hypersensitiveness, and introspection. During the course of the European war mental cases having some of the cardinal characteristics of each of the two mental diseases mentioned and at times definite evidences of malingering have caused a great deal of thought, but of all cases none were as difficult to handle as the condition which proved in many cases to be a combination of hysteria and malingering.—(D. G. SUTTON.)

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HOLMES, B. Dementia precox studies. *Illinois Med. Jour.*, January, 1917.

Following along the course set by himself three years ago, when he expressed the opinion that there was a physical basis for the youthful insanities, the author in the current article attributes



many of the cardinal symptoms of dementia precox to the formation of histamin in the intestines. Histamin is said to be formed from histidin by the action of one of the colon bacilli, at a temperature of 37 C., under anaerobic conditions, after an exposure of five days. For such a process to take place in the human intestine there must, of course, be a mechanical blocking of some kind, and this the author claims is brought about by a spasm of the sphincter of Cannon. This spasm, which is said to be analogous to spasms of the pylorus and larynx in children, is thought to be due to calcium poverty of the blood. It has been demonstrated that abnormally low blood pressure, a frequent symptom of dementia precox, can be raised to normal by means of intestinal irrigation through appendicostomies, so the author suggests that the relief of the cecal stagnation and subsequent histamin formation should be sought along the same lines.—(D. G. SUTTON.)

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WILTSHIRE, H. A contribution to the etiology of shell shock. *Lancet*, London, June 17, 1916.

Early in the war attention was drawn to the results of the use of powerful explosives upon the nervous system. These become manifest in a condition which, for want of a better term, was called neurasthenia and later "shell shock." The syndrome was so frequent that many believed it to be malingering or imitative, while others regarded it as hysterical. In any case, the subject is important. There is no doubt that past history of the individual influences the character of the symptoms displayed. The physical traumata are also contributory, and it is probable that there is somewhere a break in the chain of neurons governing the particular function involved. It seems that the syndrome is most likely to occur when to the effects of shock conditions are added previous long continued anxiety and nervous exhaustion. This implies a certain cerebral instability. It is noteworthy that the mental confusion, inattention, fatigue, and hallucinations are the symptoms heretofore ascribed to cortical injuries.

The writer concludes that the wounded are practically immune from shell shock, presumably because a wound neutralizes the action of the psychic causes of shell shock, that exposure and hardship do not predispose to shell shock if troops are well fed.

While it is theoretically possible that physical concussion resulting from shell explosion might cause shell shock, it is certain that this must be regarded as an extremely rare and unusual cause.

Chemical intoxication by gases generated in shell explosions can not be more than an exceptional cause of shell shock.



Gradual psychic exhaustion from continued fear is an important predisposing cause of shell shock, particularly in men of neuro-pathic predisposition. In such subjects it may suffice to cause shell shock *per se*.

In the vast majority of cases of shell shock the exciting cause is some special psychic shock. Horrible sights are the most frequent and potent factor in the production of this shock. Losses and fear of being buried are also important. Sounds are comparatively unimportant.

Consideration of the causes and frequency of relapses favors an original cause of a psychic nature. Any psychic shock or strain may cause a functional neurosis, provided it be of sufficient intensity relative to the nerve resistance of the individual.—(R. S.)

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HANES, F. M. The spinal fluid syndromes of Nonne and Froin and their diagnostic significance. Am. Jour. Med. Sc., July, 1916.

Examination of the spinal fluid has become a routine diagnostic measure and increasing knowledge of it has served to augment its value. Froin found fluids with a yellow color, containing numerous cells, which upon standing coagulated spontaneously and massively due to their high fibrin content. These phenomena were termed Froin's syndrome. Later Nonne showed fluids with an excess of proteid (strongly positive phase 1) with no pleocytosis.

The writer believes that these phenomena are closely related and that the syndrome of Nonne is an early manifestation of a process which later becomes that of Froin and that when properly interpreted is of the greatest value in the differential diagnosis of spinal cord lesions.

He concludes that compression of the spinal cord and its meninges from any cause leads to the formation of a cul-de-sac, more or less complete, distal to the site of compression. This leads to the characteristic changes in the spinal fluid. The earliest of these has been described by Nonne as an increase of proteid without cell increase. Later if the compression of the cord persists, the fluid gradually becomes yellow in color (xanthochromia), the proteid content increases enormously, and the fluid, when removed, coagulates spontaneously (Froin syndrome). Pleocytosis may or may not be present, depending upon whether or not the meninges are inflamed by the pathological process causing the compression. The xanthochromia of the spinal fluid must be distinguished from staining of the fluid by hemoglobin derivatives (erythrochromia). The spinal fluid syndrome of Nonne-Froin is very helpful and reliable in the diagnosis of lesions of the spinal cord. Its presence always indicates a compressive lesion of the cord.—(R. S.)



Psychopathic Laboratory, the Municipal Court of Chicago. Eighth and Ninth Ann. Rep., December 1, 1913, to December 5, 1915.

To those who are interested in the application of the newer methods of psychiatry to the problems of everyday life these reports offer a fund of concrete information.

Chicago established this laboratory on May 1, 1914. No pains were spared to secure the services of a director eminently qualified to conduct it. The results have amply justified its establishment. Even the skeptics have been convinced of its utility. No longer is there any doubt of the close connection between mental and physical defectiveness and criminal conduct.

It considers largely "defective delinquents," the term applied by Healy to the group constituting so much of the flotsam of our large cities, which not only includes persons who are physically normal, but drug victims, alcoholics, and syphilitics. Here also are found those in the various stages of the neuroses and even frank mental diseases.

Defectives do not react as normal individuals to punitive methods, so the deterrent effect is lost and their use invalidated. Hence it is vastly important to evolve methods of detecting this class of offenders, as their frequent presentation in court merely serves to clog the administration of justice and no benefit is obtained. In the laboratory no single method of examination is considered reliable. The physical examination alone is often convincing. Psychiatric, neurological, and the purely psychological tests are utilized.

The commingling of various kinds of defectiveness requires all methods of examination and calls for a high degree of skill and experience on the part of the examiners.

Laboratory methods alone are not relied upon. A complete history of each case, the circumstances of the delinquency, the character of offense, all data concerning the environment and heredity which may expose the characteristics of the offender are condensed. In accord with our beliefs it has been found that there is little chance of the skilled examiner being imposed upon by those under examination. Frauds have been easily detected.

The serious misconception of some persons that psychological tests are mathematical in precision and measure normal intelligence, also the necessity for considering a case from all aspects, are emphasized.

The service is vitally interested in the problem of defectives. Many of our candidates for enlistment are in this group. The reason is plain. In their school life, say at thirteen or fourteen, they are two or three grades below normal. Perhaps they are believed to be lazy, stupid, or vicious. After continued failures of adaptation the parents allow or encourage them to go to work in the hope that they will do better. Here their course is even more difficult. They have



no ability to concentrate, no efficient judgment, no sense of responsibility, no ambition to surmount obstacles. This course leads to their discharge and more or less endless efforts to stay employed.

Their enforced idleness leads to doubtful associations, because normal social ties are impossible and they drift to a low social level. Deprived of social expectation, as they have failed repeatedly and are expected to fail, they lose the normal incentive to ambition and become used to the disapproval of employers and relatives.

Then comes the desire to escape all these disagreeable conditions. They wish to go far away from it all. What offers more inducements than the encouraging posters of our recruiting service? If successful in passing the recruiting officer, it can be readily appreciated that they will be unable to adjust themselves to the rigid demands of a discipline which far exceeds that of the environment they left. They very soon come into conflict with authority and not only cause their superiors trouble, but are valueless, and even a menace to the service.

It is stated further that diagnosis is imperative. Unless the defect is recognized as such every form of punishment applied to them aggravates their degradation and leads to hopeless criminality. The laboratory has demonstrated the frequent alliance between imbecility and dementia precox. This has been recognized by the Germans in their "pfropfbephenia," which is feeble-mindedness with an engrafted dementia precox.

This is a frequent complex in the service. The deterioration process is seemingly precipitated by the stress imposed by the effort to adjust to service conditions.

The methods necessary in handling the feeble-minded are not applicable to caring for those with dementia precox, and may even lead to unpleasant if not dangerous results. Emphasis is placed upon the necessity of having the aid of psychiatry in determining the status of the defectives. It is satisfying to read that undue importance is not attached to the psychopathic elements alone. Unassisted they are glaringly deficient. The extent and variety of the physical defects among the delinquents are surprising. This accounts for the service escaping most of the defectives who apply for enlistment.

It also vindicates the opinion that careful physical examination coupled with the information obtained in the routine questions, literacy, and the impression made upon the examiner will exclude most undesirables; only a small percentage, in which formal mental tests would be necessary, should pass the recruiting office, and these can be determined better at a training station by a skilled examiner, as the use of the so-called intelligence tests by ever-changing medical officers is a waste of time and may possibly exclude desirable men.



One of the clear indications of the laboratory's first year's work is the importance of dementia precox, both pure and associated with feeble-mindedness as a criminal psychosis. It is the commonest form of mental disease.

The laboratory utilizes all intelligence and mental tests, but relies mostly upon the "world test," the most adamant of them all, an assaying crucible of highest value which records and evaluates the reactions of cases to their environment. It checks up their capability of adjustment, their failures and successes at home, in school, at work, etc.

Especial importance is attached to the "acid test" imposed by the socio-economic period when the individual is expected to become self-supporting, to maintain himself, to have responsibility thrust upon him. It confirms what is predicted by all other tests.

A valuable part of the report is a complete statement of the scope of the laboratory and the training and qualifications essential to directing experts. This is valuable information and should be read in its entirety by those interested.

The importance of records is emphasized. Upon their completeness and preservation depend the ultimate value of all such work.

It is satisfying to read the criticism of those whose diagnostic ability is limited to the quantitative side of the Binet-Simon and like tests, where, for instance, a case aged 8 or 9 years will test normal on the scale used, and be declared so, and where the mental arrest comes later. A large amount of feeble-mindedness is overlooked in this way. If the diagnostic effort is confined to the horizon of the Binet scale, cases of dementia precox, drug habitués, alcoholics, adult and juvenile paretics, as well as morons, will be overlooked.

To be well equipped an examiner should be thoroughly prepared in normal and abnormal psychology.—(R. S.)

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## SURGERY.

H. F. STRINE, Surgeon, United States Navy.

PENFOLD, E. A. A battleship in action. Jour. Roy. Nav. Med. Service, iii, No. 1, January, 1917.

As result of his experience aboard a British battleship in the Battle of Jutland, Fleet Surg. E. A. Penfold, R. N., brings out several points worthy of our consideration.

Early in the action the forward battle dressing station with much of its equipment was badly damaged as result of explosion of a shell. The same explosion destroyed the medical storeroom, in the forward part of the ship. The personnel attached to the forward dressing station suffered greatly, several men being killed.



In the forward dressing station and the adjacent parts of the ship 18 were killed outright, 8 others died subsequently, and 42 other casualties, 23 of which were severe, occurred. Of the 42 casualties mentioned, 27 were burns due to combustion of cordite.

The burns were flash burns and occurred only upon exposed surfaces.

The author lays stress upon instruction in first-aid and transportation of injured for all officers, fire and repair parties, as well as ambulance parties, and suggests—

(a) That two medical storerooms "of equal importance" be separately but centrally located in protected positions, thus lessening chance of total destruction of all stores and dressings by similar casualty on a big ship.

(b) That light, noninflammable masks be worn by those exposed to danger from cordite burning.

(c) That a first-aid cupboard (in this case a metal locker 10 by 11 by 7 inches) be permanently installed and equipped at each gun.

(d) That haversacks containing dressings, tourniquets, etc., be distributed to the various isolated stations.

(e) That, owing to restlessness, the wounded and burned were far more comfortable on mattresses on deck than swinging in hammocks.

(f) That those wounded in an action similar to the one described should seldom if ever be returned to the same ship for duty, because of the marked psychic effect of surroundings upon them. "Several of those who did return, although not severely wounded, showed markedly nervous symptoms, which possibly might not have occurred if they had been sent to other ships, with entirely fresh surroundings."

The author commends the Neil Robertson stretcher as result of his actual practical use of it. This is interesting in view of the several theoretical disadvantages which the stretcher appears to manifest to those who have examined it, but have not seen it used in action.—(J. C. PRYOR.)

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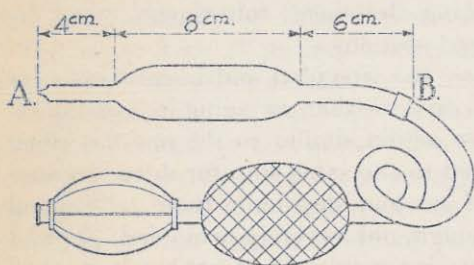
STERZI, I. A simple apparatus for the use of iodine vapors in the treatment of gunshot wounds. *Ann. di Med. Nav. e Col.*, May-June, 1916.

Dr. Sterzi describes a simple apparatus of his own, for the use of iodine vapors in the treatment of the various kinds of wounds and general surgical conditions. The apparatus consists of a glass tube of a total length of 18 centimeters, of which 4 cm. are at one extremity, and is  $\frac{1}{2}$  cm. in diameter; 8 cm. form the body of the tube with a diameter of 2 cm.; while 6 cm. form the other extremity with a diameter of  $\frac{3}{4}$  cm. Point of exit A is a very minute opening for the escape of the iodine vapors, while end B is bent at an obtuse angle and serves for the attachment of a rubber tube with a hand bulb.

To use the apparatus, remove the rubber tube at B, place a small quantity of iodoform in the body of the glass tube by means of a paper funnel, and reattach the rubber tube. Then gently heat the tube containing the iodoform over an alcohol lamp till the vapors of iodine of a reddish-violet tint rise, and gently squeeze the rubber bulb and direct the vapors through exit A to the condition under treatment.

When these vapors come in contact with a suppurating or ulcerated surface, a dark color forms, due to the deposit of metallic iodine, and in a short time the pus disappears and the surface becomes red and rich with granulations.

The author describes several cases of deep penetrating wounds treated by means of these iodine vapors with excellent results. Such cases as bayonet wounds, or gunshot wounds with purulent discharges, have been cured in a short time, and in deep penetrating wounds, which, owing to lack of time or facilities could not be operated upon, the use of these vapors has yielded excellent results.



A catheter previously sterilized and attached to the tube end A can be used in connection with the apparatus for the application of the vapors to deep-seated localities and in very deep wounds, withdrawing the catheter gently while the vapors are issuing

from its extremity so as to completely fill the entire tract of the wound with the vapors; the external dressing of these wounds consisting simply of a dry sterile pad, or alcohol dressing.

The author describes in detail several cases of deep abscesses, fistulas, suppurating buboes, osteomyelitis, etc., which were cured very rapidly by the iodine-vapor treatment while they had resisted ordinary aseptic and antiseptic treatment for long periods of time.—(J. A. BIELLO.)

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MORISON, A. E., and TULLOCH, W. J. The treatment of wounds in war by magnesium sulphate. Jour. Roy. Army Med. Corps, October, 1916.

After citing instances of the favorable action of magnesium sulphate dressings in war wounds the authors give a record of experiments with this salt as to its physiological action, and their conclusions are as follows: "(1) From the first series of experiments it appears that  $MgSO_4$  exhibits to a greater degree than do the other salts investigated the desirable property of interfering with the digestive activity of pus."



This statement is made with reservation as the experimental methods that one is forced to employ are open to certain criticisms, and I suggest that the rate of epithelialization of the wounds treated would give a truer index of the property than experimental investigation does.

"(2)  $\text{MgSO}_4$  has not so marked an action on phagocytosis as one would expect and, therefore, even if it be absorbed to a slight extent, it would not have a deleterious influence on the process, while salt, being more readily absorbed, might well interfere with this function of the leukocytes.

"(3) Experimental work in physical chemistry and pharmacology points to  $\text{MgSO}_4$  as the least absorbable of the readily soluble salts, while clinical evidence—absence of pain, etc.—points in the same direction.

"(4) By virtue of the nonabsorption of  $\text{MgSO}_4$  the granulations produced are more compact than when a more readily absorbable salt is employed.

"(5) The Mg ion has a markedly inhibitory action on the growth of streptococci and *B. coli*, and a slightly inhibitory effect on the growth of pyocyanus. It has, however, no easily demonstrable influence in the concentrations examined, on the growth of staphylococci, or on the diphtheroids investigated."

Incorporating these conclusions in a final note one may say that it appears from the above findings that  $\text{MgSO}_4$  would be the most satisfactory salt to employ for the production of "lymph lavage," and its properties indicate that it might be used satisfactorily and safely in the form of a fomentation.

I lay stress on this last point, for if the fomentations only require renewal twice daily the dangers of manipulations are much reduced and the work of the wards is lightened.

"We wish to point out that we do not suggest that  $\text{MgSO}_4$  solutions ought to be employed for a first dressing for fresh wounds. These dressings we think should be strongly antiseptic in character, their function being prophylactic rather than curative. It is as a curative dressing in the succeeding phase that we suggest  $\text{MgSO}_4$  might be made use of with great advantage."—(R. H. LANING.)

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Boggs, R. H. Differential roentgen diagnoses in bone diseases. New York Med. Jour., January 20, 1917.

The author deals with the more common bone diseases, excluding the rarer infections, basing his interpretation of the roentgenogram on the following points: (1) History, (2) physical signs, (3) evidence of disease or tumors in other parts of the body, (4) roentgenographic appearances and their correct interpretation.



He lays particular stress on the facts that the roentgenologist should have a thorough knowledge of the changes of bone due to age; the laws of the roentgen rays as regards distortion; the technic employed; that the roentgenogram should not be relied upon, as some diseases have their site in the marrow and therefore present no change in density and architecture of the bone; that in some cases great damage can be done in waiting for the roentgenogram to reveal the trouble; several diseases may show the same changes in density, but the pathological changes produce an entirely different architecture, while again in other diseases the picture is very similar and the only value of the roentgen rays is to disclose bony destruction.

In tuberculosis of the bones and joints assistance is often obtained by examining the chest, because the bronchial glands may be the source of infection. "Rarefaction is nearly always constant when the disease is of some duration, and is due to absorption of the lime salts. It is to be remembered that translucency occurs in a bone from nonuse, for instance, after fractures as well as in tuberculosis. The extent or presence of such conditions can be determined by comparison with the joint of the opposite side. In tuberculosis the roentgenogram shows bone atrophy or rarefaction, bone destruction, sequestra, and abscess formation. When the disease is of a few months' duration, one or more of these may be present; it should be realized that they may be caused by other diseases.

"In tuberculous osteitis there is no abnormal appearance until nutrition of the trabeculae is interfered with. But as soon as this occurs bone atrophy or rarefaction is present. The typical roentgenograph of tuberculous osteitis shows atrophy, one or more areas of bone destruction, and a hazy or foggy appearance. \* \* \*

"Osteomyelitis, in the early stage, usually can not be detected by the roentgen rays. Very often at the beginning the course of the disease is rapid, and many patients die before a diagnosis is made. \* \* \* The earliest roentgen-ray appearance is a slight increase in periosteal shadows at one or more places and a definite swelling of the soft parts. After six or eight weeks' duration the bony changes usually give a very characteristic picture. The alternating dark and light areas with rarefaction, showing a softening and loss of lime salts, seen at one or both epiphyseal ends of the bone, extending to a greater or less length of the shaft, ending abruptly at the epiphyseal cartilage associated with new bone formation, is a characteristic picture of osteomyelitis. \* \* \*

"Sarcoma \* \* \* causes absorption of bone from within, followed by expansion and at the same time osseous deposits on the undersurface of the periosteum. Fine trabeculae may pass through its substance from wall to wall of the capsule, which gives a more or



less honeycombed appearance on the roentgenograph. The shaft of the bone above and below the growth is normal. \* \* \*

"The chief manifestations of syphilis of the bones are epiphysitis, periostitis, and gumma. There is an irregular epiphyseal line with periosteal new bone formation of the shaft side of the epiphyseal line. It may be confounded with tuberculous epiphysitis, but gives a different picture. In tuberculosis we have rarefaction, erosion, or typical fuzzy appearance. In syphilis we sometimes have a separation of the epiphysis but it is to be remembered that thickening of the shaft on the epiphyseal side is diagnostic of syphilis. \* \* \* The mouse-eaten or mosslike appearance of the periosteum is very characteristic. Gumma may appear either in the form of a circumscribed periostitis, causing round nodes and sometimes softening and breaking down, or may begin in the marrow or in the spongy parts of the bone. The gummatous infection of bones, if localized, shows erosion and rarefaction of a limited area of the shaft of the bone with new periosteal bone formation on either side of the affected area."—(H. L. GALL.)

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JACOBSON, J. H., and MURPHY, J. T. The mechanics of the stomach after gastroenterostomy. *Am. Jour. Obst.*, January, 1917.

A more or less general impression has been formed that a new anastomotic opening in the presence of a patent pylorus will close in time. We have been taught that it is always necessary in such cases to permanently occlude the pylorus.

The authors from an extensive review of the literature have submitted a résumé together with a report of personal observations on 17 patients on whom a posterior vertical no-loop gastroenterostomy was performed; six times for duodenal ulcer, seven times for gastric ulcer, three times for pyloric adhesions, and once for benign pyloric stenosis.

Their fluoroscopic observations range from two months to four years from time of operation.

CONCLUSIONS.—(1) All patients examined in this series were uniformly well.

(2) Gastroenterostomy openings properly made and placed do not obliterate.

(3) The gastroenterostomy openings functionate equally as well in the presence of either an open or closed pylorus.

(4) It is not necessary to artificially occlude the pylorus in gastroenterostomy.

(5) The gastroenterostomy opening to secure the maximum amount of drainage must be of ample size and placed as near the pylorus as possible, preferably in the antrum pylori. Such openings

must not be made on the fundus of the stomach nor on the lesser curvature.

(6) Gastroenterostomy is essentially a drainage operation.

(7) Serious distention in the jejunum does not occur after gastroenterostomy; the food is seen to pass rapidly through the many loops of the small intestines before it finally stops. Even in those patients who are entirely relieved of their former symptoms food can be forced backward into the stomach from the jejunum, and although this can be done easily, such regurgitations do not seem to make any difference.—(H. F. S.)

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TALLMAN, M. H. Indications and contraindications for cholecystectomy. *North-west Med.*, xv, No. 2, November, 1916.

The author states that in a study of recent literature he finds practically every surgeon advocating removal of the gallbladder for infections. At the Mayo clinic, during the years 1913 to 1916, there were 1,767 cholecystectomies performed, with a mortality of 1.2 per cent; cholecystostomies during that period numbered 435, with a mortality rate of 3.4 per cent. Of the patients operated on by excision, 71 per cent were cured, while 22 per cent improved and 7 per cent failed to improve. The drainage cases showed 53 per cent cured, 38 per cent improved, and 9 per cent not improved.

CONCLUSION.—Cholecystectomy is the operation of choice, cholecystostomy the operation of necessity. Cholecystectomy gives the highest percentage of cures, the lowest mortality; convalescence is much shorter and more comfortable and it prevents recurrences.

Cholecystectomy is contraindicated in the aged, in exhausted, debilitated patients, in the presence of acute virulent infections, in pancreatitis and common duct obstructions.—(H. F. S.)

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GUTHRIE, D. Indications for cholecystectomy. *Am. Jour. Med. Assn.*, lxxvii, No. 9, August 26, 1916.

A questionnaire was submitted to 45 experienced abdominal surgeons, and from replies received the author's deductions are as follows:

(1) Reports show that recurrences happen in 9.5 per cent of cases that have had cholecystostomies performed. The recurrence of trouble following cholecystectomy is certainly small; the exact percentage is not known.

(2) Cholecystectomy is employed much more frequently than in the past and is a better operation, but it is attended with many more operative difficulties and dangers than simple drainage. The gallbladder should be removed when its wall is diseased or the patency of the cystic duct is in question, provided the patient's condition will permit it.



The contraindications for the operation are critical states of the patient, acute empyema, infection of the ducts, and pancreatitis, where drainage is desired. It is safer to treat acute empyema of the gallbladder with simple drainage, and it is only fair to explain to the patient that a second operation may be necessary.—(H. F. S.)

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RISLEY, E. H. Hemostasis by interposition of muscle, fat, and fascia in parenchymatous organs. *Surg., Gynec., and Obst.*, xxiv, No. 1, January, 1917.

A series of 12 animal experiments was carried out in the laboratory of surgical research, Harvard Medical School, with the object of determining which tissue, muscle, fat, or fascia is the best hemostatic in controlling serious bleeding from such organs as the kidney, spleen, liver, etc.; also, what is the fate of such tissues when interposed.

The author arrives at the following conclusions:

(1) The ideal hemostatic in wounds of parenchymatous organs is interposed muscle tissue taken at the time of operation from the patient's own body.

(2) Such muscle in order to most effectively stimulate fibrin formation should be jaggedly cut with a knife and not crushed as when cut with scissors, nor should its hemostatic properties be extracted by its contact with salt solution.

(3) Fascia and fat act to a more limited degree as hemostatics; fascia more than fat, but both very much less than muscle. In the liver, however, both fascia and fat seem at times to be very efficient hemostatics.

(4) These tissues readily unite to the bleeding surface to which they are sewed and form a smooth, solid scar.

(5) Microscopical examination of specimens removed at varying intervals after operation show absence of sepsis, a beginning transformation of muscle into fibrous tissue, a partial absorption of fat and change into fibrous tissue, no change in fascial transplants, in practically every case a firm blending of the interposed tissue with the cut surface of the parenchymatous tissue, the formation of new blood channels, and no degenerative changes of any note.

(6) We conclude, therefore, that muscle, fascia, and fat can be safely interposed into these tissues and after acting as immediate hemostatics later undergo fibrous changes and form a firm union with the parenchymatous tissue.—(H. F. S.)

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NOLAND, L. The Carrel method of wound sterilization. *South. Med. Jour.*, December, 1916.

Considerable confusion exists as to the requirements and proper technic for the preparation of Dakin solution. The author in concluding his paper gives the technic of Dr. Daufresne, as follows:



"The solution of sodium hypochlorite for surgical use must be free from caustic alkali. It must only contain 0.45 to 0.50 per cent of hypochlorite. Under 0.45 per cent it is not active enough and above 0.50 per cent it is irritant.

"With chlorid of lime—bleaching powder—having 25 per cent of active chlorin, the quantities of necessary substances to prepare 10 liters of solution are the following:

Chlorid of lime—bleaching powder—25 per cent Cl act.....	gm. 200
Sodium carbonate, dry—soda of Solway.....	80
Sodium bicarbonate.....	100

"Put into a 12-liter flask the 200 grams of chlorid of lime and 5 liters of ordinary water, shake vigorously for a few minutes, and leave in contact for 6 to 12 hours—one night, for example.

"At the same time dissolve in 5 liters of cold ordinary water the carbonate and bicarbonate of soda.

"After leaving from 6 to 12 hours pour the soda solution into the flask containing the macerated chlorid of lime, shake vigorously for a few minutes, and leave to allow the calcium carbonate to be precipitated. In about one-half hour siphon off the liquid and filter with a double paper to obtain a good clear liquid, which should always be kept in a dark place.

"*Titration of chlorid of lime—Bleaching powder.*—Because of the variation of the products now obtained in the market, it is necessary to determine the quantity of active chlorin contained in the chlorid of lime which is to be used. This is in order to employ an exact calculated quantity according to its concentration.

"The test is made in the following manner: Take from different parts of the jar a small quantity of bleaching powder to have a medium sample, weigh 20 grams of it, mix as well as possible in a liter of water, and leave it for a few hours. Measure 10 mls of the clear liquid and add 20 mls of a 10 per cent solution of potassium iodid and 2 mls of acetic acid or hydrochloric acid. Then put drop by drop into the mixture a decinormal solution of sodium hyposulphite, 2.48 per cent, until decolorization results. The number of milliliters of hyposulphite employed multiplied by 1.775 will give the weight N of active chlorin contained in 100 grams of chlorid of lime.

"The test must be made every time a new product is received. When the result obtained will differ more or less than 25 per cent, it will be necessary to reduce or enlarge the proportion of the three products in the preparation. This can be easily obtained by multiplying each of the three numbers 200, 100, and 80 by the factor  $25/N$ , in which N represents the weight of the active chlorin per cent of chlorid of lime.



"*Titration of Dakin solution.*—Measure 10 mls of the solution, add 20 mls of potassium iodid one-tenth, 2 mls of acetic acid, and drop by drop of decinormal solution of sodium hyposulphite until decolorized. The number of milliliters used multiplied by 0.03725 will give the weight of hypochlorite of soda contained in 100 mls of the solution.

"Never heat the solution, and if in any case of urgency one is obliged to resort to trituration of chlorid of lime in a mortar, only employ water, never salt solution.

"*Test of alkalinity of Dakin solution.*—To differentiate easily the solution obtained by this process from the commercial hypochlorites, pour into a glass about 20 mls of the solution and drop on the surface of the liquid a few centigrams of phenolphthalein in powder. The correct solution does not give any colorization, while Labarraque's solution and Eau de Javel will give an intense red color, which shows in the last two solutions the existence of free caustic alkali."—(H. F. S.)

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ASHHURST, A. P. C. Surgical experiences with encapsulated empyema and abscess of the lung; a plea for exploratory thoracotomy. *Internat. Clin.*, December, 1916.

Typical cases, well illustrated, are presented exhibiting the difficulties of recognizing and reaching pus within the pleura even when exploratory puncture is resorted to, while it is made plain how much can usually be obtained by surgical means. Refusal to operate when the needle fails to reveal pus at the time set for operation even though pus was previously found is bad surgery. The surgical technic is carefully described. Local anesthesia is preferred, the intercostal nerves above and below the rib to be resected being blocked with an injection of the anesthetic fluid, novocain or eucain being preferred. For abscess of the lung thoracotomy is preferred to the production of a therapeutic pneumothorax by Forlanini's method, as the former gives better opportunity for locating and draining the abscess.—(R. C. R.)

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#### HYGIENE AND SANITATION.

C. N. FISKE, Surgeon, and R. C. RANDELL, Passed Assistant Surgeon, United States Navy.

LEWIS, F. C. A new method for the destruction of bacteria in large volumes of milk by means of electricity. *Jour. Board Agric.*, London, xxii, No. 12, pp. 1229-1238.

A method for destroying bacteria in milk by means of electricity is described. The essential feature of the method consists in passing a suitable current of electricity through the milk during its passage through a tube connecting a container with a receiving vessel. The

electric current so acts that the major portion of all bacteria in the milk are killed, and no chemical alteration in the milk so treated has been observed.

Judged from a standpoint of the percentage reduction, the electrical method gave highly satisfactory results (over 99.9 per cent) as well as from the standpoint of the presence of *Bacillus coli* (or manurial contamination).

The results of feeding tubercle-bacilli-containing milk, treated and untreated, to guinea-pigs also indicated that the electrical treatment is an effective destroyer of the tubercle bacilli.

It is stated that even in the hottest weather the milk is perfectly fresh for three or four days after treatment. The change which ultimately takes place is a characteristic one, viz, a mild, pleasant, acid reaction and flavor. The putrefaction which is noticeable so often in stale steam-“sterilized” milk has never been observed. Milk treated by this electrical process is deemed perfectly suitable as a medium for the action of culture ferments.—(E. W. BROWN.)

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HADLEY, P. B., and CALDWELL, D. W. The bacterial infection of fresh eggs. Rhode Island State Bull., cliv., pp. 3-70.

After a historical résumé of investigations on the bacterial infection of eggs this bulletin takes up a report of experiments begun in 1911. The results of the study are summarized as follows:

Of 2,520 fresh eggs examined by the indirect method, 8.7 per cent showed bacterial infection in the yolk. None of the 111 whites examined showed infection, while the yolks of the same eggs gave a percentage slightly less (4.5 per cent) than the average for the series (7.7). The percentage of infection obtained for individual hens per year varied between 2.8 and 15, the average being 9. No hen laid all sterile eggs during any full year. No correlation was observed between percentage of infection and hatchability, or between the percentage of infection and the fecundity, age of the hens, or season of the year. The percentage of infection for infertile and for fertilized eggs was essentially the same. The nature of the infecting organisms occurring in the eggs was briefly studied, and 40 bacterial types were obtained, including 11 cocci, 28 rods, and 1 spirillum.

It is concluded that the most probable source of primary egg infection is the ovaries of the fowl, which become infected by bacteria escaping through the intestinal wall into the portal circulation. The nature of the bacterial species occurring in the primary infection makes clear the fact that primary infection plays no rôle in bringing about the decomposition of eggs. For the factors determining this result we must look mainly to the secondary infections. The nature



and extent of the normal primary infection stands in no causal relation to embryo mortality in incubating eggs, and the losses in "dead-in-shell" eggs can not be explained on these grounds.

A bibliography of literature cited is given.—(E. W. BROWN.)

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KATZ, J. R. *The velocity of the staling of bread.* K. Akad. v. Wetensch. te Amst. Versl., xxiii, 1914, pp. 652-658.

In continuation of previous work, the author reports experimental data indicating that the velocity of the staling of bread and its loss of imbibing power (which is thought to depend on a physical change in the starch of the flour so that it becomes harder and less capable of holding water) do not run quite parallel. It was found that the diminished capacity of the starch to absorb water took place the more rapidly, and that the vapor pressure of both fresh and stale bread was approximately equal to that of pure water.

The conclusion is given that the staling of bread is connected with a change which takes place not only with wheat and rye starch but also with all varieties of starch, but that it leads to practically important results only in the case of wheat and rye starch.—(E. W. BROWN.)

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KATZ, J. R. *The staling of bread from the physiological-chemical standpoint.* Ztschr. f. physiol. Chem., xcv, 1915, No. 2-3.

The author concludes that the principal cause of the staling of bread is a change in the starch, brought about by baking, by which the starch granules become harder and less capable of holding water and by which a part of the soluble polysaccharids become insoluble. At the same time there is a transference of the water in the starch of the gluten. Furthermore, the consistency of the gluten skeleton of bread influences the general texture of the bread.

In the second paper the author reports a further investigation of the changes produced in the starch granules of bread by baking and during staling. These data indicate that during baking the high temperature disturbs the equilibrium which ordinarily exists between starch, water, and gluten, and fresh bread results. During staling this equilibrium tends to be restored; at higher temperatures, accordingly, bread remains comparatively fresh.

In the third paper, from the data of experiments reported, he concludes that the starch granules of sago, rice, potatoes, barley, corn, oats, lentils, and marena undergo the same changes in the baking and staling of bread as occur in wheat and rye bread.—(E. W. BROWN.)

MAUREL, E. The use of box rations by the French troops. Bull. Acad. Med., Paris, lxxv, No. 9, pp. 254-259.

Box rations for army use are suggested which contain a mixture of meat and either fresh or dried vegetables chopped in small pieces. It is intended that each box shall furnish about 30 grams of protein and 500 calories of energy and that each man shall receive 4 of these boxes, the total weight of which shall not exceed 1 kilogram. To complete the ration, it is recommended that the men receive 1,200 grams of bread, 0.5 liter of wine, and 100 grams of dried fruit (preferably figs) every two days. The total energy value of this ration is 3,000 calories daily.—(E. W. BROWN.)

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MANHEIMER, W. A. Comparison of methods for disinfecting swimming pools. Jour. Infect. Dis., January, 1917.

In this article the author gives a description of experiments in various methods of disinfecting various New York swimming pools. His conclusions are as follows:

"The value of ultraviolet light as a disinfectant in swimming pools has not yet been definitely determined. (a) Swimming pools equipped with ultraviolet-light apparatus showed lower bacterial pollution during its use than before its use. (b) A somewhat longer exposure of the water to the light would seem desirable; in most instances bacterial reduction was not observed after the water had passed through the ultraviolet-light apparatus.

"In regard to the method of adding chemicals to the water, it appears that the value of the slow continuous addition or of the single daily dosing varies with the chemical used. Copper sulphate gave the better results when added gradually and continuously, while sodium hypochlorite gave the better results with single daily dosing.

"The relative efficiency of chemicals for water disinfection may be expressed as follows:

"(a) Calcium hypochlorite: High efficiency, low cost, not much care necessary in handling.

"(b) Chlorin gas: Efficiency high, cost very low, easily handled.

"(c) 'Lectrocid': Cost ten times as much as for hypochlorite, high efficiency, very easily handled.

"(d) Copper sulphate: Cost high, efficiency low, stains tiles, causes reduction in transparency of water, easily handled.

"Final decision on a standard method for pool disinfection has not yet been reached, and can not be until after ozone and other methods still under investigation have been fully tested. In the nine pools examined, refiltration was practiced in all cases, a procedure which should be standard in all indoor pools."—(R. H. LANING.)



## TROPICAL MEDICINE.

E. R. STIRR, Medical Director, United States Navy.

Low, G. C. A case of amebic abscess of the liver occurring 20 years after the original attack of dysentery. Brit. Med. Jour., December 23, 1916.

The case reported was one in which there had been no attack of dysentery for 20 years. In examining the stools of the patient, two *E. histolytica* cysts and a single mobile ameba were found. Emetin was then commenced: The blood showed 14,000 leukocytes with 60 per cent of polymorphonuclears, 11 per cent of large mononuclears, and 1 per cent of eosinophiles.

The history of the present illness was that nine weeks before his admission to hospital he had had feverish attacks with general malaise, diagnosed as influenza. After a few days he began to have ague attacks with sweating followed by epigastric and right costal pain.

The patient died of heart failure about two weeks after admission to hospital and at necropsy a liver abscess was found in the right lobe, containing chocolate-red pus and showing vegetative *E. histolytica*.

The large intestines showed a practical absence of any macroscopic lesion, this in a measure confirming the statement of freedom from dysenteric attacks for 20 years.—(E. R. S.)

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DOBELL, C., and Low, G. C. A note on the treatment of lamblia infections. Lancet, London, December 23, 1916.

The authors note that the parasites tend to disappear at intervals so that a case positive one day may be negative the next, no cysts or free flagellates being found after the most careful examination. For this reason, reports of success in treatment with various drugs may be due to periodic disappearance.

A case is given where the stools of a patient with lamblia infection were examined for 100 consecutive days. There were periods of 7 to 10 days during this time when the stools were negative, to again show parasites on the succeeding days.

Bismuth salicylate gr. 20 and betanaphthol gr. 15 were given three times daily for six days without result. Methylene blue, 3 grains three times daily, was next tried but such severe symptoms of bladder irritation set in that the drug had to be discontinued after two days of treatment. This methylene blue did not contain any zinc. The drug did not seem to have any effect on the parasite. They next tried turpentine, in 10 minim doses, three times daily for five days, following with guaiacol carbonate, 5 grains, three times daily for three days. The parasites continued to be present in the feces in large numbers in spite of this treatment.

In reporting on the blood examination of lamblia infections the findings were practically normal, this including large mononuclears and eosinophiles.—(E. R. S.)

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ROGERS, SIR L. Disappearance of malignant tertian crescents from the blood following the intravenous injection of tartar emetic. *Brit. Med. Jour.*, January 6, 1917.

The author notes that his uniform success with tartar emetic in the treatment of kala-azar led him to try the drug on malarial crescents, which stages of the parasites are uninfluenced by quinin.

The dosage varied from 4 to 8 cg. of tartar emetic given in a 2 per cent solution. This drug seemed to destroy benign tertian gametes as well as those of malignant tertian.

The suggestion is made that this treatment may be of value in the eradication of sexual forms from malaria carriers.—(E. R. S.)

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#### **PATHOLOGY, BACTERIOLOGY, AND ANIMAL PARASITOLOGY.**

C. S. BUTLER, Surgeon, and R. H. LANING, Passed Assistant Surgeon, United States Navy.

COLES, A. C. Easy method of doing Widal's reaction for typhoid. *Brit. Med. Jour.*, May 13, 1916.

The method devised by Coles is as follows: With a color grease glass writing pencil, or a piece of wax, draw a line across the middle of two slides at right angles to their long axes. Spread a film of the blood to be examined on one-half of each slide, and when dry, spread a film of normal blood, as a control, on the other half of each slide. Dry. Place a small drop of an emulsion of killed typhoid bacilli on the center of each half of both slides, and rub the drop well over the film of blood, taking care not to pass from one-half of the film to the other without sterilizing the needle. On one slide carefully place a cover glass on each half, taking care that the two cover glasses are well separated in the middle by the mark of the grease pencil. Place the other slide on a piece of wet blotting paper, and cover with a Petri dish to prevent evaporation for a period of 15 to 20 minutes. At the end of that time dry carefully over the flame and then stain. Examine both halves of the first slide under a moderately low power. At the end of 15 minutes (often much sooner) distinct clumps of agglutinated bacilli will be seen, provided the case be one of typhoid or the blood of one who has been prophylactically inoculated with a typhoid vaccine, while on the other half, the control, the bacilli show no signs of clumping. The red cells are practically invisible, but the leukocytes are clearly defined, and it is quite easy, provided the film has been thin, to determine the presence or absence of leukocytosis, and to make, if necessary, a differential count of the various forms of white cells present.—(E. P. HUFF.)



CHANTEMESSE, A., and GRIMBERG, A. Mixed infection. Presse méd., June 15, 1916.

Ordinarily typhoid fever is not always due to invasion by the typhoid bacillus alone. Among 13 fatal cases examined, the typhoid bacillus proved to have been the sole infective agent in only 2 cases; in 7 instances the paratyphoid A organism was also present, and in the remaining 4 the paratyphoid B bacillus. The paratyphoid infection may be added either from the outset or later in the course of the disease. Blood cultures under these conditions reveal the various organisms, and serum tests show the several specific agglutinins arising from these organisms distinct from the group coagglutinins. Comparison of the temperature and specific agglutinin curves of patients reveals the influence on the former invasion by fresh types of typhoid germs. To such secondary invasions are to be ascribed the temperature fluctuations often termed recrudescences, relapses, the amphibolic stage, abnormal prolongation, etc. Recovery from ordinary typhoid fever commonly confers an immunity which includes one or both paratyphoid infections. Vaccination against the typhoid bacillus alone, however, yields no general immunity of this kind. When a multiple typhoid infection is diagnosed, a corresponding mixed vaccine should be used in its treatment.—(E. P. HUFF.)

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NICHOLS, H. J. Experimental observations on the pathogenesis of gallbladder infections in typhoid, cholera, and dysentery. Jour. Exper. Med., November 1, 1916.

The author has investigated the manner of production of the carrier state for *B. typhosus*, *B. dysenteriae*, and *V. cholerae*, using rabbits and guinea-pigs as experimental animals. The method was to create a fistula of the common bile duct and study the outflow of bile bacteriologically after inoculation of pure cultures of the several organisms, sometimes into an ear vein of the animal, and sometimes into branches of the portal vein. The history of similar work is reviewed and the matter of whether infection of the gallbladder is produced from a cholangitis descending or ascending, or transverse (i. e., from blood vessels in the gallbladder wall), is considered.

It is pointed out that the bile of different animals shows different degrees of antiseptic power, and the author inclines to the belief that it depends largely upon its alkalinity. The writer inclines to the belief that infection of the gallbladder is a descending one and the number of organisms recovered at the fistula depends to a certain extent upon the dose inoculated and the particular blood vessel chosen for the injection. He considers the matter of cure and prevention of the carrier state. The paper, which is an important one, should be referred to in the original.



The author's summary is as follows:

(1) The theory of the production of gallbladder lesions in typhoid, by descending infection of the bile from the liver receives support from investigations with the common duct fistula method in the rabbit. More bacilli appear in the bile with increased doses and more gallbladder infections are obtained by increased doses. More bacilli appear in the bile after mesenteric vein injection than after ear injection and more lesions result under the first condition. More bacilli appear in the bile after injection of the same dose in immunized animals than in normal animals and more lesions also result in immunized animals. In cholera and dysentery the same mechanism is suggested with the additional factor of a portal system septicemia.

(2) After the appearance of microorganisms in rabbit bile, their fate is apparently largely determined by the antiseptic properties of the bile. One hundred per cent infections can not be secured by intravenous doses large enough to insure the presence of microorganisms in the bile. Rabbit bile *in vitro* may be antiseptic to the microorganisms considered. The antiseptic action is largely due to its alkalinity. It is apparently possible to protect the rabbit to some degree against gallbladder infection by a previous injection of sodium bicarbonate.

(3) Alkaline therapy is suggested in the prevention and cure of gallbladder carriers.—(C. S. B.)

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WHITTINGTON, T. H. A report on the use of stock vaccine in infection by the *Bacillus typhosus*, with an analysis of 230 cases. Jour. Roy. Army Med. Corps, October, 1916.

This article is a dissertation on the value of the use of stock vaccines in the treatment of 230 cases of typhoid fever. One half this number were given the vaccine and the other half used as controls. His summary and conclusions are as follows:

"In the total vaccinated cases there were 29 in which it appeared that vaccine had a definite good influence. Of these 20 belonged to classes 3 and 4, i. e., to those classes in which the prognosis is good. In other words, good results are more often obtained where good results can be expected by ordinary methods of treatment alone. On the other hand, the mortality rate and the average length of fever in these classes was slightly worse among the cases who had vaccine.

"Among the cases belonging to classes 1 and 2, in which the vaccine appeared to do good, none had severe lung involvement. Those cases which had much bronchitis or bronchopneumonia (the average severe case) ran the severe course which is usual and vaccine appeared to be of no avail. To say that if the average severity of the cases treated had been less the vaccine would have had better results is merely to say, I think, that the cases would then have done better



anyhow. From all this it would appear (a) that it is in just those cases in which the physician so much requires help that vaccine is so disappointing; (b) that vaccine neither shortens the fever nor reduces the number of complications in even that class of case which is likely to do well; (c) that there is a decided suspicion that vaccine increases the incidence of hemorrhage.

"The conclusion, therefore, is that the use of a stock vaccine in typhoid fever can not be recommended as a routine treatment. I should add that these conclusions are largely contrary to the impressions which I received during the treatment of the earlier cases. I had not then seen a sufficient number of similar cases which did well without vaccine and being rather biased in its favor I gave undeserved credit to this treatment."—(R. H. L.)

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FALLS, F. H. The bacteriology of pemphigus neonatorum. Jour. Infect. Dis., January, 1917.

From his studies the author concludes as follows: "Pemphigus neonatorum is a peculiar type of staphylococcic dermatitis occurring in the newborn, but capable of transmission to adults.

"The causative organism is a strain of *Staphylococcus aureus*, indistinguishable culturally and biologically from some other strains of staphylococcus, but differing under certain circumstances morphologically, and showing different pathogenic tendencies.

"This organism has fulfilled all of Koch's laws with respect to the disease. Typical lesions from which the organism has been recovered have been produced in man. It is pathogenic for lower animals, but injections have thus far failed to reproduce the specific disease.

"The epidemic nature and possibly fatal termination of the disease make its early recognition and active treatment highly desirable.

"In view of the clinical and experimental data it appears that the infection spreads by contact with infected material and that the portal of entry is the intact skin.

"In keeping with its etiology and pathology, the name epidemic staphylococcic vesicular dermatitis of the newborn is suggested for this disease."—(R. H. L.)

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MATHERS, G. The etiology of acute epidemic poliomyelitis. Jour. Infect. Dis., January, 1917.

The author's summary of his studies are as follows: "In a bacteriologic examination of fresh material from 10 cases of acute poliomyelitis a peculiar polymorphic streptococcuslike organism has been isolated in 9 instances, in 7 of which the growth has been pure. Similar organisms have been demonstrated microscopically in the tissues of the central nervous system of these cases. Cultures of

this coccus injected into rabbits have produced paralysis of various groups of muscles and characteristic lesions in the central nervous system consisting of hyperemia and edema of the tissues, with hemorrhages, round-cell perivascular infiltration, and neurophagocytosis in the spinal cord, especially in the gray substance, similar in every detail to the changes considered characteristic of acute poliomyelitis in man.

"This micrococcus has been recovered from the lesions in the inoculated rabbits by both cultural and microscopic methods.

"The artificial cultivation of the poliomyelitis coccus in an ascites-fluid tissue medium under anaerobic conditions causes changes in the media which can not be differentiated from those previously described for cultures of the so-called virus of poliomyelitis. Morphologically also this bacterium when grown on the same media is similar to the virus, and in stained smears it appears in minute Gram-positive coccuslike bodies arranged in pairs, groups, and chains. These minute forms disappear when the organism is cultivated in other media under aerobic conditions.

"The morphologic, cultural, and pathogenic character of the poliomyelitis coccus thus far determined indicate that it is an important factor in the disease."—(R. H. L.)

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KOLMER, J. A., SCHAMBERG, J. F., and RAIZISS, G. D. The numeric relationship of infection to the chemotherapy of experimental trypanosomiasis. *Jour. Infect. Dis.*, January, 1917.

From their studies the authors conclude as follows: "These experiments demonstrate that in the chemotherapy of trypanosomiasis there is an important relationship between the number of trypanosomes injected into the test animal and the trypanocidal activity on the part of the drug.

"This relationship is particularly in evidence with respect to the amount of drug necessary to effect complete sterilization; while rats infected with 500,000 trypanosomes may be sterilized with 0.001 gram of arsenobenzol per 100 gram of rat, this is not the case when larger numbers of trypanosomes are injected.

"The influence of numbers is less marked when the rats are very heavily infected, as with numbers over 2,000,000. In these instances, arsenobenzol or salvarsan in dose of 0.001 gram, or 0.6 gram per 60 kilograms of body weight, retards the appearance of trypanosomes in the peripheral blood, but does not sterilize. The time of appearance of the parasites in the blood is likewise not greatly influenced by variation in the numbers used in inoculation.

"The numeric relationship of infection to the results of chemotherapeutic experiments is therefore a subject of considerable importance, and more particularly in comparative tests."—(R. H. L.)



CECIL, R. L. A study of experimental nonhemolytic streptococcus lesions in vitally stained rabbits. Jour. Exper. Med., December, 1916.

In this article the author first reviews the literature on the pathological changes produced in the body by streptococci and he deduces the following facts from the review:

(1) Opinion is almost unanimous in considering Aschoff bodies as specific for rheumatic fever.

(2) There is considerable diversity of opinion as to the origin and character of the large cells which for the most part constitute the lesion. By Coombs they are considered endothelial, by Geipel, Bracht, and Waechter, and others, fibroblasts; while Aschoff himself looks upon them as transformed macrophages or wandering cells.

(3) Efforts to reproduce Aschoff bodies experimentally have met with varying results in the hands of different investigators. Coombs and de Vecchi and Jackson all claim to have produced lesions which they consider essentially identical with Aschoff bodies. Bracht and Waechter, and Thalhimer and Tothschild produced lesions which are not identical with Aschoff bodies and are easily distinguished from them.

It is obvious that once granted that Aschoff bodies are a specific manifestation of rheumatic fever, the experimental production of them by injection of streptococci would be strong evidence in favor of the streptococcal origin of rheumatism. The present study was undertaken to determine, if possible, the origin of the peculiar cells in the myocardial lesion; as the work progressed it was deemed desirable to include also a study of the other structures involved, especially the joints.

In view of the disagreement as to the origin of the cells which constitute the Aschoff body in the human heart and the lack of harmony in the results from experimental study of the lesion, it was thought that the employment of a vital stain might prove of value.

Thirty-eight rabbits in all were used in the experiments. Six different strains of nonhemolytic streptococci were employed. Three of these strains were isolated from cases of rheumatic fever and three from cases of infectious endocarditis.

The author's conclusions from his experiments are as follows:

"(1) Repeated injections into rabbits of nonhemolytic streptococci isolated from human cases of infectious endocarditis or rheumatic fever will produce an acute arthritis in the rabbit similar in most respects to the arthritis of acute rheumatism.

"(2) Microscopical sections of the joints show a gradual transition from an acute exudative inflammation to advanced organization.

"(3) Endocarditis and pericarditis occur in a small percentage of cases, and focal lesions in the myocardium consisting of necrosis and

the infiltration of cells are frequent. These focal lesions differ considerably from Aschoff's submiliary nodules.

"(4) Lesions in the kidneys and liver occur but are not characteristic.

"(5) By means of the vital stain it has been shown that the large endothelioid cells which play a prominent part in the joint and myocardial lesions belong to the group of so called macrophages or wandering cells and probably develop from the vascular endothelium."—(R. H. L.)

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#### EYE, EAR, NOSE, AND THROAT.

E. J. GROW, Surgeon, and G. B. TRIBLE, Passed Assistant Surgeon, United States Navy.

WOODS, A. C. Ocular anaphylaxis. Arch. Opth., xlv, No. 7.

The pathogenesis of sympathetic ophthalmia can not be satisfactorily explained by the older ciliary nerve theory, and the specific bacterial findings of Deutschmann have not been confirmed.

The mycotic theories assuming a metastatic inflammation of the sympathizing eye, fail to explain the sympathetic ophthalmia resulting from noninfectious disorders in the sympathetic eye. The cytotoxic theory of Golowin assumes an autocytotoxin produced by the degenerating cells which is specific for uveal cells, and which, upon being carried by the blood stream to the sympathetic eye sets up an uveitis.

Elschnig believed that the disintegrating uvea is reabsorbed as an antigen and leads to a hypersensitiveness, especially of homologous tissue. Further absorption of this disintegrated uvea or some part of it leads to an intoxication, manifested clinically as an inflammation of the uveal tract. Experiments were made to determine the fundamental points of the anaphylactic theory of sympathetic ophthalmia. It was found that homologous uvea possesses antigenic properties and that it was strongly organ specific. Homologous uvea absorbed from one eye can produce a hypersensitiveness in the second eye and intoxication can result from perfusion of the second eye with similar antigen. From the experiments it seems probable that the pigment epithelium of the uveal tract is responsible for the antigenetic properties.—(G. B. T.)

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KNAPP, A. Present status of the operation for the extraction of cataract in the capsule. Arch. Opth., xlv, No. 7.

Inasmuch as the aim of a cataract operation is to obtain the best vision with the least risk to the eye, the method of operation giving the best results, and least dangerous, should be selected. The results



after intracapsular extraction have not as yet been observed or tabulated in such a manner as to serve as a basis for comparison.

Reports by Herman Knapp show 52 per cent obtaining a vision of 20/40 or over among 1,000 cases. Webster reported 100 operations, with a vision of 20/40 or better in 57 per cent. Duncan reported 69 per cent obtaining that vision in 100 cases.

Smith reporting on extraction in the capsule in 1905 gave the visual results in 2,616 cases as 99.27 per cent first-class results, 0.38 per cent second-class results, and 0.34 per cent failures. In a modified in the capsule method the writer got visual results of 20/40 or over in 97 per cent of cases.

On the other hand, risk of the eye is greater, without properly trained assistants, and responses from eight of nine ophthalmologists who had performed the intracapsular method show that two do not practice the operation now at all, one does it in 50 per cent of the cases, and the remaining five perform it in cases with certain provisions. At the same time the intracapsular method is so ideal that further endeavors in ophthalmic surgery must be along these lines, devising a method easier to perform and less dangerous to the eye than the Smith-Indian operation.—(G. B. T.)

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IDE, C. E. The relations of obstruction of the eustachian tube to local and systemic conditions and to prognosis regarding restoration of hearing. *Laryngoscope*, xxvii, No. 1.

Obstruction may be temporary, due to boggy swelling or inflammation, or permanent, due to formation of scar tissue with contraction.

The location may be at the eustachian fossa, at the mouth of the tube, in the course of the tube, or in the isthmus. It may be relieved at the fossa by curettage; at the mouth by incision and dilatation with bougies; in the course of the tube by electrolysis and the use of bougies.

The chief causative agents in the acute cases, grip, colds, acute suppurative otitis media, sea and plunge bathing, tonsillitis, and local infection from the teeth, accounted for the most cases, while among the chronic tubal obstructions, catarrhal otitis media in its several forms, deflection of the nasal septum, diseased conditions of the tonsils and teeth, lead in frequency as causes.

Chiefly, the symptoms complained of were deafness—alone, or deafness associated with stuffiness or tinnitus, earache, vertigo, and apoplectic labyrinthitis. Treatment in the author's hands has given considerable relief and is much simplified by the use of Holmes's nasopharyngoscope.—(G. B. T.)

Crowe, S. J., Watkins, S. S., and Rothholz, A. S. Relations of tonsillar and nasopharyngeal infections to general disorders. Bull. Johns Hopkins Hosp., xxvii, No. 311.

After reviewing the anatomy and physiology of the upper air passages, and the influence of infections from the tonsils, and the mucosa of the nasopharynx, the authors give the following indications and contraindications for tonsillectomy.

#### I. LOCAL DISORDERS IN THE UPPER AIR PASSAGES.

- (1) Hyperplasia of the tonsils causing difficulty in swallowing, articulation, or breathing.
- (2) Frequent tonsillitis or quinsy.
- (3) A chronic laryngitis or bronchitis may be often benefited by a nose or throat operation.
- (4) A chronic suppurative or catarrhal otitis media or an eustachian-tube infection.
- (5) Chronic diphtheria carriers.
- (6) Any of the "reflex neuroses" in children, such as asthma.
- (7) New growths.

#### II. FOR LOCAL TROUBLE IN THE CERVICAL GLANDS DRAINING THE TONSILS.

- (1) Simple hyperplasia of the glands at the angle of the jaw.
- (2) Tubercular cervical adenitis.

#### III. FOR GENERAL SYSTEMIC DISORDERS SECONDARY TO A FOCUS OF INFECTION IN THE TONSILS.

- (1) Infective arthritis in which the periarticular changes predominate.
- (2) Myalgia or myositis.
- (3) The early stages of a glomerulo-nephritis.
- (4) The various nervous symptoms designated as neurasthenia.
- (5) Occasionally an iritis, refractory to all treatment, may be benefited by tonsillectomy.

#### IV. AS A PROPHYLACTIC MEASURE.

- (1) In chorea, acute rheumatic fever, and heart lesions, but the operation should not be undertaken in the acute stages of the disease.
- (2) In cases of chronic nephritis and arteriosclerosis that give a history of repeated attacks of tonsillitis.

#### V. THE CONTRAINDICATIONS FOR TONSILLECTOMY.

- (1) A tonsillectomy should never be undertaken during the acute stages. It is best to wait at least three weeks after all symptoms have subsided.
- (2) Diabetes.



(3) A tonsillectomy is rarely of benefit in chronic deforming types of arthritis.

(4) Nothing is gained by tonsillectomy during the acute stages of chorea, acute rheumatic fever, or endocarditis. The tonsils are not the only portals of entry for organisms in these diseases.

The operative and postoperative complications. Ether is used in every case, unless there is some definite contraindication. The operative field is kept dry and the tonsils removed by sharp incision.

All bleeding points are picked up with clamps, and at end of operation ligated with fine silk. A plug is kept in the nasopharynx.

In 1,000 tonsillectomies there have been no fatalities, 38 cases of bleeding after the patient was sent to the ward (only 12 of them severe), two postoperative pneumonias, and four cases of acute otitis media.—(G. B. T.)

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LYNCH, R. C. A résumé of my year's work with suspension laryngoscopy. *Laryngoscope*, xxvi, No. 12.

Owing to several minor mishaps, the author now uses dental impression spoons, filled with a molding compound, and makes an impression of the entire upper jaw, this resulting impression when cold fits accurately the upper jaw, and is superior to the usual tooth plates. Sensitive areas, loose teeth, or broken teeth are protected, and no injury is done to the enamel.

The table used permits the raising or lowering of the patient 20 inches, the top can be tilted at various angles, or moved in a circle to take advantage of the light. Foot and shoulder braces are used, and a support to receive the head.

Four cases of intrinsic epithelioma of the larynx, 19 papillomas, as well as a pedunculated fibroma were operated upon by this "two-handed method."

Foreign bodies in the trachea and esophagus can be removed by making use of this apparatus.—(G. B. T.)

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SYME, W. S. Nasal infection and deafness. *Glasgow Med. Jour.*, March, 1916.

Great stress is laid on the influence of nasal and nasopharyngeal affections in the causation of deafness. Irritation caused by excessive cigarette smoking is of importance.

Adenoids first, then posterior turbinal hypertrophy, are given as the most frequent conditions associated with deafness. The connection of anterior turbinal hypertrophies and septal deformities with deafness is less clear, but improvement in hearing not infrequently follows operative treatment of these conditions.

Cases of inner-ear deafness, and of otosclerosis should be excluded, since no improvement follows treatment in these cases.—(G. B. T.)

RIDPATH, R. F. The possibilities and limitations of nonsurgical bronchoscopic treatment. Jour. Am. Med. Assn., lxxviii, No. 4.

Tumors or growths outside the trachea or bronchial tube pressing and occluding the lumen may cause an obscure condition which can be cleared up. Papillomas, false membranes, ulcerations, or calcareous deposits are readily seen. Strictures may be dilated and ulcerations treated.

Tracheitis, or tracheal bronchitis, is one of the most frequent conditions met with. It, like bronchial asthma, appears in two forms, first, highly inflamed or mucus-covered areas of mucosa, or a dry condition, the secretions, if any, having formed hard crusts or scales. The treatment is divided into that appropriate for the first condition, such as the application of glycerite of tannin on tampons used every other day. For second type, remove all incrustations, touching the underlying ulceration with silver nitrate, or 10 per cent alcoholic solution of iodine. The dry reddened membrane responds to stimulation by the ultraviolet ray applied through the bronchoscopic tube. The picture seen in bronchial asthma varies markedly in cases in which all other conditions are excluded.

The author recommends the use of 1-5,000, or 1-10,000 epinephrin in salt solution, after which is applied by tampon equal parts of compound tincture of benzoin and boroglycerid.

Papilloma of the larynx in children may be treated nonsurgically by several means—fulguration, radium, roentgen radiotherapy, or medicinal agents.

*Limitations.*—Those with valvular heart disease, long standing cases of asthma, with barrel-shaped chests, are not fit subjects for this treatment. Anatomical peculiarities or defects may render this method impossible. Idiosyncrasy to cocaine may induce toxic syncope.—(G. B. T.)



## REPORTS.

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### THE USE OF PROPHYLACTIC SERA IN THE TURKISH ARMY.

By E. P. HUFF, Passed Assistant Surgeon, United States Navy.

The following observations on the use of prophylactic sera in the Turkish Army were recently obtained from a reliable source, and it is thought may be of interest to the department. The information covers the year 1915.

"The writer, who some months ago made the prediction that disease would have more to do with the ending of the struggle on the Gallipoli Peninsula than the missiles of modern warfare, has been happily disappointed in his prediction. Up to the present time disease has played a very minor part, while disease in epidemic form has not made its appearance at all among the soldiers of this part of the army. Taking into consideration the history of epidemic diseases in Turkey (with the memory of epidemics in the Turkish Army during the Balkan war still fresh in our minds), we are led to look for some extraordinary cause for the nonappearance of the usual run of diseases during this war.

"The simple explanation lies in the fact of the universal employment of prophylactic sera. An exception to prove the rule is seen in the terrible epidemic of typhus fever which carried off some 100,000 soldiers and civilians in eastern Asia Minor during the early months of 1915, no prophylactic serum having been available for this disease.

"In the Turkish Army during this war the use of prophylactic inoculations for typhoid, Asiatic cholera, smallpox, and dysentery have been thoroughly and systematically carried out, with the result that the Turkish army has been enabled to carry on a strenuous and long-sustained campaign with an effectiveness which has surprised the world.

"A recent visit made by the writer to the bacteriological institute in Constantinople, where these sera are prepared, demonstrated the ability of the Turkish physicians to cope with an emergency with very modest equipment. Here sera are prepared in bulk for use in the army. Instead of small, individual sealed tubes, large ordinary bottles, containing some 500 mils each, are used. As large numbers of soldiers are injected at one time, the use of serum in bulk is not a great disadvantage. The sterilization is done in the

ordinary autoclave; for culture flasks, large, ordinary flat bottles are used, which, being laid on the flat, answer the purpose satisfactorily.

"A visit to the stables showed a dozen or more splendid horses which are being used for the production of various sera; also a considerable number of hares and guinea-pigs, which are kept for experimental purposes and for the testing of the sera.

"The method of giving the sera, when the soldiers are to be inoculated for the four diseases mentioned, is as follows:

First day.....	Smallpox vaccination.
First day.....	Typhoid serum, $\frac{1}{2}$ mil.
Third day.....	Cholera serum, 1 mil.
Fifth day.....	Typhoid serum, 2 mils.
Seventh day.....	Cholera serum, 2 mils.
Tenth day.....	Typhoid serum, 3 mils.

"Some days later the dysentery serum may be given as follows:

First day.....	Dysentery serum, $\frac{1}{2}$ mil.
Tenth day.....	Dysentery serum, 1 mil.

"When given separately the method is as follows:

First day.....	Typhoid serum, $\frac{1}{2}$ mil.
Third day.....	Typhoid serum, 2 mils.
Sixth day.....	Typhoid serum, 3 mils.
First day.....	Cholera serum, 1 mil.
Third day.....	Cholera serum, 2 mils.

"For smallpox, one-half the contents of the ordinary capillary glass tube is used, which, if not successful, is repeated from five to ten times at five-day intervals.

"A series of 4,000 injections of cholera and typhoid sera made by an officer in the Turkish Army, a friend of the writer, was followed in no case by complications or by local abscess. The same person reports his having given, by mistake, to each of 50 soldiers, 6 mils each of typhoid and of cholera serum within a period of six days without any untoward results excepting a slight rise in temperature following the second injection.

"The dysentery serum has been used only within the past few months. Some 2,000 injections have been made in this city (Constantinople), and no complications were seen in any case. Statistics showing whether any inoculated soldiers have, after inoculation, contracted dysentery are not yet complete.

"The serum is reported as being polyvalent, being composed of the following four strains: Flexner's bacillus, Shiga's bacillus, His's 'Ipsalon' bacillus, and Schrunck's bacillus.

"A monovalent serum of Shiga's bacillus is also prepared.

"The period of immunity conferred by the dysentery serum is estimated at approximately one year."



OBSERVATIONS ON NAVAL AVIATION.<sup>1</sup>

By G. F. COTTLE, Passed Assistant Surgeon, United States Navy.

This ship is fitted with a new apparatus, the catapult. This apparatus is planned to hurl into space a heavier-than-air flying machine with the aviator seated at the wheel, and to hurl it from the ship's deck at a speed sufficient to allow the machine to fly away from the ship without touching the water. The apparatus is composed of a track, a compressed-air cylinder, a car to run on the track, and a cable connected with the piston of the air cylinder at one end and with the car at the other end. The track is elevated 12 feet 9 $\frac{1}{2}$  inches above the quarter-deck, and the quarter-deck is 21 feet 3 inches above the water line at stern. The airplane is fastened to the car by a device that can be released at the right moment. The pilot takes his seat, starts his motor, and when the propeller is spinning at top speed the air is allowed to rush into its cylinder, the cable is pulled upon, and the airplane with its pilot is pulled along the track toward the stern of the ship in such a manner that in the distance of 103.25 feet it acquires a velocity of 45 miles an hour. At the end of the track the tripping device releases the airplane and by means of its momentum plus the thrust of its rapidly revolving propeller it leaves the car, the track, and the ship and flies away.

The dangers to personnel from the use of this launching device may be said to be due to: First, the structural defects which any new apparatus is apt to develop; second, possible failure of the apparatus to develop sufficient velocity; third, possible failure of the releasing device to release; fourth, inexperience of the pilot.

The apparatus must have many more trials before it can be said to be reasonably safe for the pilot, and then must be subjected to tests at sea, with the rolling and pitching of the ship as a factor before it can become a reasonably useful and safe appurtenance of the flying game.

All safety precautions that can possibly be thought of are used now. When the launching device is shot off, a motor boat is kept a little way from the ship at the moment of use, with the doctor in it to aid in rescue if needed.

This ship has now for nearly two and one-half years been associated quite directly with aviation and it has been possible to observe aviators closely. They lead an exceptionally healthy out-of-door life. They must protect themselves against the sun in the Tropics and against the cold in winter.

The machines of to-day have a fusilage which helps greatly in protection against cold and sun. The eyes and ears are protected by means of goggles and cotton.

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<sup>1</sup> From Annual Sanitary Report, U. S. S. *North Carolina*, Jan. 1, 1917.

Accidents to the machine are not infrequent, but they seldom injure the aviator beyond a wetting. Accidents serious enough to injure the aviator have resulted in death from the impact of the fall alone or from a combination of the stunning effect of the fall with drowning.

Ships from which aviators operate should at all times have in the water during flying operations a fast motor boat and in the boat a specially trained hospital corpsman, and the machines should be kept under observation at all times, so that any accident can be immediately attended by the motor boat. A man held under water will drown inside of five minutes, so that instant readiness for rescue is an essential of safety from drowning. The aviator recognizes this danger by wearing a kapok jacket during flight. He carries a wire cutter in his pocket to cut himself free of entangling wires should accident imprison him under water.

In teaching men to fly, aviators talk about the "air feel"; this can be defined as "the quality of knowing or sensing when the airplane in flight has a normal position and speed." It is the aviator's judgment acquired by experience and formed from his senses. It is based on a consideration of wind pressure, centrifugal and centripetal forces, and the force of gravitation acting on the inertia of his body in combination with what he sees and hears. In learning to fly the ability to acquire the "air feel" varies with different individuals.

It is my belief that people differ in the rapidity of their perceptions and in the speed of their psychomotor reaction to visual, auditory, and tactile impressions, and that those who are distinctly slow in these respects are not good material from which to make aviators. It is also my belief that there are people whose emotional control is poor and that these people are poor material from which to make aviators. At present the only measure of these qualities is found in the vaguely defined yet real estimate of a student aviator's abilities formed by his flying teacher and described by him as the student's ability or lack of ability to get the "air feel."

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#### SANITARY NOTES FROM THE U. S. S. "HANNIBAL." <sup>1</sup>

By W. W. HARGRAVE, Assistant Surgeon, United States Navy.

Fish Poisoning at Georgetown, Grand Cayman, B. W. I.—A report on this place was made last year.<sup>2</sup> The fish poisoning met there deserves mention. The opinion is held locally by the natives that all the fish caught inside the reef are poisonous. The officials claim to have reliable information to disprove this. Barracuda, goat fish,

<sup>1</sup> From Annual Sanitary Report, Jan. 1, 1917.

<sup>2</sup> NAVAL MEDICAL BULLETIN, x, No. 4, Oct., 1916.



and yellow jack are the fish most commonly believed to be poisonous. All concede that the barracuda is the chief offender, and some are of the opinion that it is much more dangerous to eat local fish caught during or just after a hard blow when the ocean bed is stirred up. The symptoms resemble more or less a case of ptomaine poisoning and are treated as such with fairly satisfactory results. The condition comes on rather suddenly in 8 to 36 hours after eating the fish. Tingling of fingers and nose and pricking or itching of the skin are the first symptoms. Vomiting soon follows, and then diarrhea. The sooner and greater the vomiting after eating the fish the milder will be the symptoms. The serious cases are those that do not "throw" much, as the Caymanian expresses it. Prostration, general body pains, headache, lacrimation, intolerance of light, blurred vision, and bladder symptoms, chiefly a nagging desire to urinate, occur. The duration is indefinite, anywhere from three weeks to several months. During the latter part of November just past a family of 12 had barracuda for dinner at 2 p. m.; at or about 9 p. m., 9, or all those who had eaten the fish, were suddenly taken with fish poisoning. It is now over two months since this happened, and some of those attacked are still convalescing. A very severe case was seen by me six months ago and was seen again only a few days ago. The patient is still in a pretty bad way. The nervous and bladder symptoms are those that he is principally troubled with. It is a rule with the natives not to eat the fish until the second day. On the day that the fish is caught they will feed a small portion to a cat or dog, and if the animal is not made sick, the following day they will eat the fish. Another method is to place some ants in a vessel with a piece of the fish and see if they are living or have much life about them the next day.

**FUMIGATION OF SHIP WITH HYDROCYANIC-ACID GAS.**—The ship was fumigated with hydrocyanic-acid gas, at our request, by the Public Health Service for the purpose of rat destruction. All compartments were fumigated simultaneously, except the engine room, which was not considered necessary by the officer in charge. Sodium cyanid in the form of nuggets about the size of an English walnut, commercial sulphuric acid, and water were the reagents used. Five ounces of sodium cyanid,  $7\frac{1}{2}$  ounces of sulphuric acid, and 10 ounces of water were used to each 1,000 cubic feet of space, inclusive of that occupied by stores, etc. A vinegar barrel or earthenware vessel, depending upon the size of the compartment, containing the acid and water, was placed in each compartment. The sodium cyanid wrapped in cheesecloth in the form of a bag was dropped into the container, the performer making his way out as quickly as possible. The container was placed so as to secure the best and most efficient diffusion of the gas, at the same time allowing ample time for the one dropping the cyanid to get out safely. Hatches and openings were closed securely



All compartments were kept closed for one hour, and after opening no one was allowed to enter for one-half hour. Quite a number of rats were killed. The fumigation was followed by intensive trapping during the rest of our stay in port, a period of 10 days. The trap used was the "official snapper." Four dozen of these traps, baited with bacon, were placed in the commissary storerooms and three rats were caught. Very soon thereafter the storerooms were renovated and painted white. No evidence of the presence of any rats aboard has been seen since the fumigation was carried out until a few days ago, when a rat was found in one of the sailing launches, having most probably come aboard while the ship was alongside the dock in Portsmouth or Guantanamo. The ship was also rid of all flies and cockroaches.

As is generally known, this gas is very poisonous, and too much care can not be taken to be sure that no one is left aboard. A muster of the crew was made on the dock just before fumigating, and later a mess attendant was found asleep on the forecastle, having slept throughout the process. It is fortunate that he was above deck and to the windward.

To convey some idea of the toxicity of this gas to those who are not familiar with it from a practical side an incident as told to me by a public health official is repeated. A ship was being fumigated in New Orleans and there happened to be a sheep, kept as a pet, aboard and walking about the weather deck. There was a leak in one of the hatches and the gas could plainly be seen escaping. The sheep walked up to the hatch, took a whiff of the escaping gas, and fell over dead. The galley, which is on the weather deck, was fumigated to rid it of flies and cockroaches. The ports and doors were not securely closed, they being of metal, and it not being an easy matter. Large cracks were left. Quite a number of flies were found dead outside the galley, having crawled upon the bulkhead and received a dose of the gas coming out of the cracks about the doors.

The ship was fumigated with carbon monoxid the year before last, and it did not prove successful. They are using less of this gas in New Orleans, and in time it will most probably be replaced altogether by hydrocyanid on account of the variable content of carbon monoxid in coal gas and the high cost as compared with cyanid and sulphur.

CAPE GRACIAS A'DIOS.—Situated in the extreme northeastern part of Nicaragua, at the mouth of the river Coco (Wanks or Segovia), and near the Honduras-Nicaraguan boundary. There are two towns, the Old Cape (Cabo Gracias) and the New Cape (Puerto Cabo Gracias). The surrounding country is low lying and swampy, and is frequently inundated during the wet season for a distance of three or more miles inland. The hills are back of the coast about 30 miles and the intervening country consists of savannahs, with a wooded elevation here



and there. Tradition has it that Christopher Columbus, on his last voyage in search of a passage to India, encountered very bad weather off the coast of Honduras, and when he rounded the cape, and sailed into the calm waters of Subeam Bay, he exclaimed, "*Gracias a' Dios;*" hence the name.

Puerto Cabo Gracias, or New Cape, is situated on the north side of the Coco River, very near its mouth. The population, all told, does not exceed 250, about 50 of which are Europeans and Americans, the remainder being about equally divided between Spaniards and Mosquito Indians. Most of the houses are built on piles, and during the rainy season the whole town is often under water. Water is obtained by collecting rain water in tanks. During the dry season there is a great shortage. There is no drainage, and the town is very dirty, dogs, chickens, and pigs are seen almost everywhere, especially under the houses. Buzzards resting on the housetops or chimneys constitute a common sight. The town is built on alluvial deposit. Cabo Gracias, or Old Cape, lies about 4 miles south of the New Cape and is approached by way of a lagoon. It has a population of about 400 Mosquito Indians, and perhaps 50 creoles. With the exception of a Moravian missionary and his family there are no Europeans. It was formerly a port of entry, but owing to the silting up of the main channel leading from the sea across the lagoon, all business interests have been transferred to the mouth of the river Coco. The place is built on sandy subsoil. The women and children go barefooted and the men usually wear boots.

In both the old and new cape the following diseases are very common: Gonorrheal infections, syphilis, malaria, hookworm, roundworm, dysentery, and pertussis. One case of elephantiasis has been seen. Mosquitoes are numerous, especially in the port, and they have recently become almost unbearable. Culex, anopheles, and stegomyia are common. Yellow fever has never been reported, to my knowledge.



The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human development, from the earliest forms of life to the modern era. He also examines the different civilizations that have arisen throughout history, and the factors that have influenced their growth and decline. The second part of the book is a detailed account of the life of the author himself, from his childhood to his present day. He describes his various experiences, his travels, and his work. The third part of the book is a collection of essays on various subjects, including politics, economics, and philosophy. The author expresses his views on these subjects, and discusses the problems that face the world today. The book is written in a clear and concise style, and is easy to read. It is a valuable work for anyone interested in the history of the world, or in the life of the author.